

OK!
LOT PROJECT

MODEL

February 1990

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AIRPLANE

THE WORLD'S PREMIER R/C MODELING MAGAZINE

CANADA \$3.75

**Build a replica 1936
Flying ACES STICK**



KIT REVIEWS:

**Astro Flight
MINI CHALLENGER**

Top Flite ELDER BIPE
D&R P-51 MUSTANG



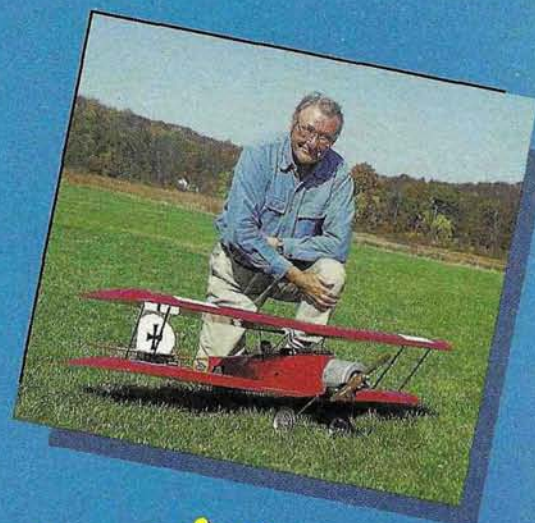
HELI SECTION:

Merced Fun Fly
Heli Float Installation
Hopping-up the Schluter Champion
Heli Flight Orientation



**Align
Your
Aircraft**

**Plotting Airfoils
Explained**



MODEL AIRPLANE NEWS



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ON THE COVER: A graphic illustration of the wide variety of subjects, types of aircraft, and age of modelers who enjoy R/C. Young Louis Garwood holds his dad's Astro Flight Mini Challenger electric; Vic Macaluso poses proudly with his large-scale D&R Mustang; and Dick Purdy smiles over his pseudo-German rendition of the Top Flite Elder Bipe. Representing the rotary-wing faction is the brightly colored Rebel heli from GMP, and the focus of the cover is Randy Wrisley's "recreated" 1936 Flying Aces Stick.

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Editorial

by RICH URAVITCH

VACATIONS ARE WONDERFUL! I just returned from a two-week cruise in the Caribbean—didn't visit any R/C clubs or hobby shops, didn't fly anything or even tweak one needle valve. I didn't *completely* forget about the hobby, though, because between snorkeling, swimming, golfing and exploring (and the occasional visits to the rum-punch barrel), I managed to think occasionally about the hobby and where it seems to be heading.

As tough as it may be to admit, I don't think many of us are *proud* of our accomplishments in R/C, (or, at least, we don't tell anyone if we are). Think about it. An angler catches that elusive "big one" and all his friends, fishermen or not, know about it. If it's a really big one, the media broaden the audience. The hunter? The golfer? Same story. The modeler does something exceptional and who knows about it? Right; other modelers. Anyone else outside the fraternity? Not likely.

It seems curious to me that in other parts of the world (e.g., Europe and Japan), R/C fliers are looked upon as achievers who are respected by their countrymen as well as other modelers. In their own countries, men like Hanno Prettner, Yukihiro Dobashi, Wolfgang Matt and others are in a league with Joe Montana, Kirby Puckett, and Curtis Strange—and why not? Are the skills developed and displayed by any of these men less than any of the others? I think not. If anything, the modelers may have the edge, since I don't think Curtis builds his own golf clubs!

Our problem is that we don't make others aware of just how many different skills are involved in building and flying one of our creations. We rarely receive the attention or recognition we deserve. When was the last time you saw anything about R/C on televi-

sion—event coverage like the T.O.C. or Top Gun? If it weren't for the prime-time piece on the Byron Expo a few years ago, we'd have nothing. Now,

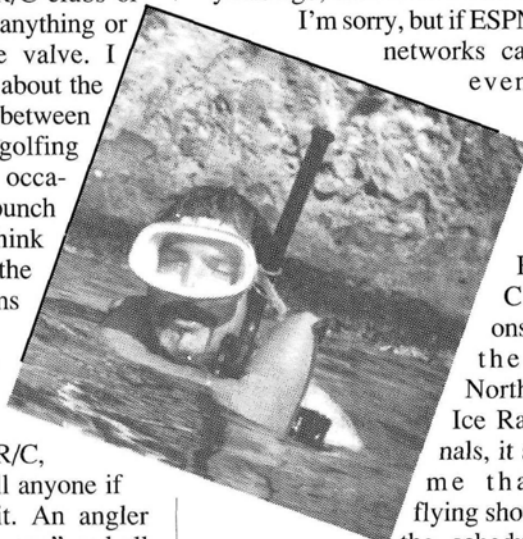
I'm sorry, but if ESPN and the networks can cover events like

the International Log Rolling Championships and the Great Northwestern Ice Racing Finals, it seems to me that R/C flying should be in the schedule also.

You'll never convince me that the public wouldn't react positively to seeing a miniature, R/C airplane being skillfully demonstrated.

I recently heard that the number of golf enthusiasts in this country has increased 25 percent over the last two years and that they now total nearly 24 million. How much of that growth can be attributed to the exposure it gets? A bunch, I bet. As I've said in the past, our image problem is one of *no image*—no visibility—and merely *calling* what we do a "sport" doesn't alter the non-modeler's perception much.

If we really do enjoy what we're doing, we should make a serious effort to convey this to others. Many of us aren't as dynamic as some of the models we fly. If things are to improve, e.g., acquiring and retaining flying sites; providing incentives for manufacturers to risk developing innovative products; and preventing the gradual erosion of what we now have, we all need to be more involved with developing our image. It's essential. ■



MODEL AIRPLANE NEWS

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Airwaves

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14-Year-Old Land Baron

I'd like to compliment you on a superb magazine. It's informative, amusing and to the point. Though I'm not yet a subscriber, it shows up on my desk every month. I'm only 14 years old, and when I come across \$25, I usually buy something more important (sorry).

I've been in this hobby for three years, and I just bought my second trainer airplane. I followed the "best way to learn how to fly" bit, and all I've mastered are big happy circles in the sky and taxi maneuvers. Oooh! Aaah! Wheee! So I thought, "Brad, you can fly by yourself; you've read 5,001 articles." So after four busted props, one replaced landing gear and a new RX battery, I've succeeded. Now that winter is coming, I can fulfill my dream. We have 28 acres of land, half of which is flat and open—perfect for snowmobiles, skiers and self-taught R/C fliers.

What was wrong with this picture? An enthusiastic novice, an abandoned airstrip 1/2 mile away and no instructor. I did get into a club; that's how I learned how to do circles. Club members are nice people, but I have more important things to spend \$25 on.

BRAD DERRY
Winterport, ME

Brad, your story touched our hearts. Thanks! We're glad that you like MAN. How did you manage to read 5,001 articles and learn to fly in just three years? The club members that I've met are also nice people. Promise to spend your \$25 wisely, and I'll send you a free subscription.

RAU

School Search

I bought an issue of *MAN* last January and I'm now up to my eyebrows in a rediscovered hobby. I'd like to attend an R/C

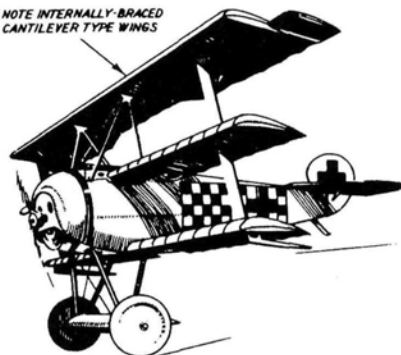
flight school, but can't find one nearby. Can you help me find one in California, Nevada or Arizona?

HAI CHAPMAN
Paso Robles, CA

Hi, Hai! We're glad we helped in your "rediscovery." The only commercial R/C training school (fixed wing) that I'm aware of is the First U.S. R/C Flight School in Shawano, WI 54166. That's a commute from Paso Robles, however! I suggest that you contact your local clubs; more and more are starting formal training programs. If any of you are aware of other schools in the country, let me know; we'll compile and publish a list.

RAU

NOTE INTERNALLY-BRACED
CANTILEVER TYPE WINGS



Move Over, Chip Hyde?

I've been very impressed with your articles—they're accurate, detailed and entertaining! I've only been in R/C flying for about a year, since I came to Korea on a company assignment. I'm working on my fourth airplane—a Sig Skybolt—and I hope to compete with it when I return to the USA. Can you recommend some books on how to enter contests with this type of airplane (including rules, regulations and aerobatic instruction)? My dream is to make it to the Tournament of Champions!

In addition, I can't find any manufacturer who offers an R/C kit of my favorite plane, the Fokker DR-1 triplane. I've seen the Guillows rubber-powered kit, but it's too small. Does any make of the Fokker DR-1 come in an R/C kit? If not, please

(Continued on page 10)

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Airwaves

(Continued from page 8)

tell me of a company that supplies plans for scratch-building this unique triplane (sizes .25 up to "Quadra power").

Keep up the good work on your publication. I devour every issue I get over here in Seoul, Korea—unfortunately, usually one month late!

GARY MOSBLEY
Fort Collins, CO

Gary, my best recommendation is to check with IMAC (International Miniature Aerobatics Club, c/o Duke Hoeckele, 9 Manchester Way, Pine Brook, NJ 07058). It conducts regional aerobatic competitions that are ideal for airplanes like your Skybolt.

The path to the T.O.C. involves much practice, which means competing, and winning, at the local level. It requires dedication and commitment, as exemplified by all T.O.C. competitors. Good luck in your pursuit.

Sources of kits for the DR-1 have all but dried up. VK used to make an excellent, though smallish, kit for .60-size engines; a larger, Quadra-powered version was produced as a semi-kit by Scratch-A-Plane. The only plan still available is a 1/4-scale, Quadra-powered machine from Nick Ziroli (29 Edgar Dr., Smithtown, NY 11787). Anyone have any other candidates? Incidentally, Gary, since copies of MAN are in such short supply in Korea, might I suggest you pass yours along to another modeler rather than eating it?

RAU

Completing a Cub

Thanks for a good model magazine, even for us way up north. I have a problem with the J-3 Cub that I bought from a friend. The drawing is so bad that I can't finish building it. It has a 250cm wingspan and is built from Span Aero Products. Do you have the address of this company? Also, thanks for "Jet Special" in the April '89 issue. When reading it, I found out that my next project is an F-16!

ERIK KARLSBERG
Haslumveien, N-3400 Lier
Norway

Erik, we think that MAN is a good magazine for readers everywhere! The 8-foot Span Aero Cub was originally manufactured just down the road from our office, but alas, like so many kits of days gone by, it's no longer available. Sorry. Maybe some of our readers can help??

RAU



U-2 Sighting?

I picked up the 60th Anniversary issue of MAN and came across the U-2 drawing on page 55. In March 1958, I was in a fighter squadron in northern Japan flying F-86Ds and received a top-secret briefing concerning the U-2. Our intelligence people didn't have pictures of it, but we were told what to look for. Lo and behold! Model Airplane News came in the mail about a week later with a complete three-view and performance specifications on the plane. I clipped out the drawing and hung it up on our Intelligence bulletin board. (Even the Japanese hadn't published any pictures of the U-2, even though they were based in southern Japan.)

Much to my amazement, the intelligence officer in our squadron insisted that the drawing wasn't allowed on the bulletin board, as the airplane was still considered classified. I was reprimanded and the drawing was confiscated; I never saw it again. I kept insisting it came out of Model Airplane News! Yes, you scooped the world. At least some of our pilots knew what the U-2 looked like; some unfortunate pilots didn't!

JACK C. AYCOCK
Denver, CO

Jack, thanks for the personal touch. We continue to hear stories of just how many ruffled feathers and red faces the original U-2 drawing produced. If only I'd been smart enough to take that guy up on

(Continued on page 12)

DU~BRO TRU~SPIN KEEPS YOU IN BALANCE!

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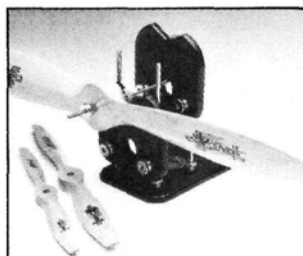
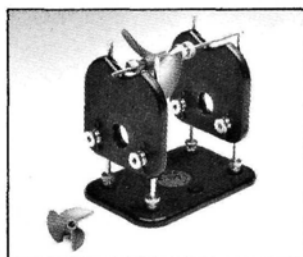
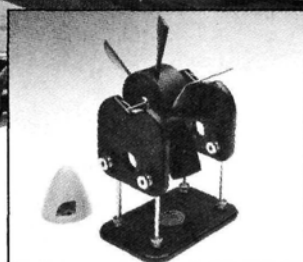
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Airwaves

(Continued from page 10)

his offer of F-117A drawings when I started this job two years ago!!

RAU



Looking for the Hustler

I'd like to build a B-58 Hustler. Would you please check if there was one built and if I could get plans? If not, I could use all the help you can give about how to get this task done. I've used kits and built from plans, but I don't know how to do it from drawings and crosscuts.

JOHN MURPHY
Buffalo Grove, IL

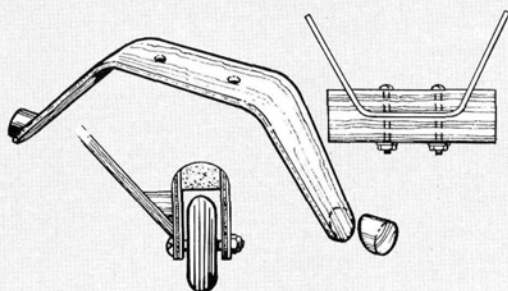
Here you go, John. The Conair B-58 Hustler was the world's first Mach-capable strategic bomber. It first flew in November, 1956, and in the five following years, 116 were delivered. If you haven't done any scratch-building, I suggest that you get some experience in building kits and drawing plans before tackling a project like this. No plans are commercially available, but I do know of a Hustler under construction in Texas. That's all I'll say until I can provide a progress report.

RAU

We welcome your comments and suggestions. Letters should be addressed to "Airwaves," Model Airplane News, 251 Danbury Rd., Wilton, CT 06897. Letters may be edited for clarity and brevity. We regret that, owing to the tremendous numbers of letters we receive, we can't respond to every one.

Hints & Kinks

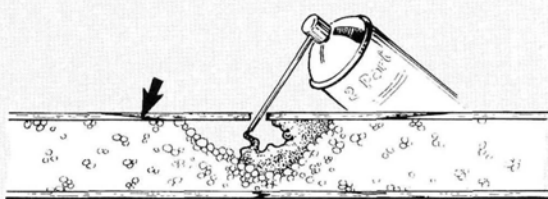
by JIM NEWMAN



BIRCH GEAR LEGS

We're all familiar with aluminum landing gears, but how many remember that they were made of wood many years ago? The material for this gear comes from the 1/2-inch-thick strips of wood in birch fruit baskets. It's close-grained and naturally springy. Soak the strips in boiling water for an hour (some even recommend adding bleach), then clamp in the wooden form jig as shown. (This jig can be cut from a 2x4.) When the strips are dry, 1/2-inch dowel facings are glued to the ends of the legs which, in turn, are glued to ply-faced wheel pants that contain the axle. Albert says these gear legs will support models weighing up to 3 pounds, and his gear has survived for more than a year now.

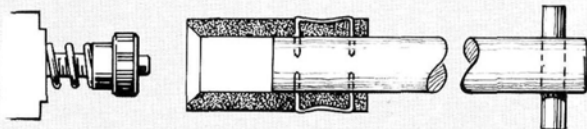
Albert Séguin, Trois Rivières, Quebec, Canada



FOAM-CORE WING REPAIR

After rejoining the broken pieces of a foam-core wing, you'll often find that much of the foam has crumbled away. George has discovered an effective way of dealing with this. Epoxy the damaged parts and push them back together, making sure the joined panels are flat and not warped. The broken part of the wing skin is carefully removed and new wood is spliced in, using a very long scarf joint, preferably in the slope of 15 to 1 (arrowed in the sketch). Make a 1/4-inch-diameter hole in the new skin, then inject foam insulation into the hole. Allow the foam to expand and vent through the hole, slice off the excess, sand flush and refinish the wing as required.

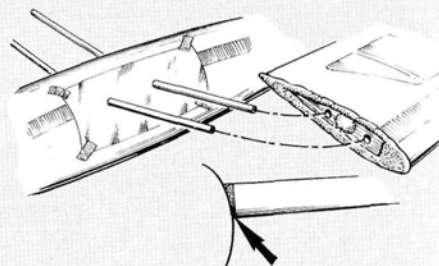
George Voss, Oklahoma City, OK



SAFETY-NEEDLE ADJUSTER

Needle valves are much too close to propellers for comfort. (When will manufacturers put them at the rear of the engine or make a provision for remote mounting?) This simple tool is made from a stout piece of tight-fitting rubber tube stapled to a dowel rod. The luxury version has a short dowel glued crosswise to aid twisting. To use, just push the tube over the needle valve, but take great care *not* to feed the tool into that spinning propeller!

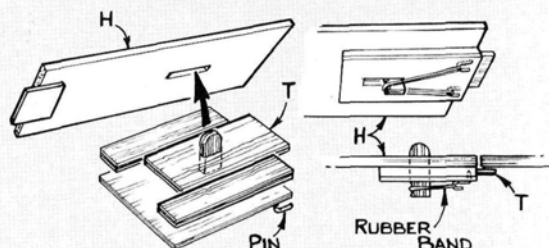
Matthew Simons, Poecking, W. Germany



FLUSH-FITTING WING ROOTS

Getting wing roots to fit flush against those shapely glass-fiber fuselages can be a frustrating experience, but here's a simple method to achieve that perfect fit. Tape Saran Wrap or waxed paper onto the fuselage where the wings will butt to it. Thoroughly wax or grease the wing rods, then butter the end rib with a mixture of epoxy and micro balloons. Slide the wing onto its rods, then tape and prop the panel into position until the filler has set hard. Slip the wing off the rods and sand the epoxy filler to match the rib contour. Simple! Arrow shows the sanded filler where it matches the fuselage cross section.

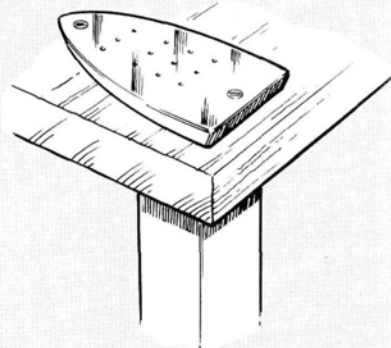
F. Burman, Nowra, N.S.W., Australia



NO-COST HATCH LATCH

Another "why didn't we think of it before" idea: Made entirely from leftover pieces of plywood, and held together with CA, this spring-loaded latch is secure, yet allows one-handed operation. It's ideal for electric models where the battery hatch is removed after every flight. Thoroughly wax the tongue (T) with soap or candle wax so that you don't glue it to the hatch (H), and use CA sparingly!

Tom Herr, Portage, IN



MODELER'S ANVIL

Sooner or later, you'll want a hard surface on which to hammer something flat. Watch your local garage sales for an inexpensive or broken clothes iron. Remove the bottom plate, drill for a couple of flat-head, countersunk wood screws and attach it to your bench, preferably over one of the legs, so that blows are transmitted directly to the floor.

Eugene King, Buffalo, NY

Model Airplane News will give a free one-year subscription (or one-year renewal if you already subscribe) for each idea used in "Hints & Kinks." Send rough sketch to Jim Newman, c/o Model Airplane News, 251 Danbury Rd., Wilton, CT 06897. BE SURE YOUR NAME AND ADDRESS ARE CLEARLY PRINTED ON EACH SKETCH, PHOTO, AND NOTE YOU SUBMIT. Because of the number of ideas we receive, we cannot acknowledge each one, nor can we return unused material.

PILOT PROJECTS

A LOOK AT WHAT OUR READERS ARE DOING

SEND IN YOUR SNAPSHOT\$!

MAN is your magazine and we always encourage reader participation. Every month, in "Pilot Projects," we feature pictures from you.

We accept color slides or prints. Contributors of photos we publish will be eligible for a grand prize of \$500, to be awarded at the end of 1990. So send a photo or two with a brief description of your plane to: Pilot Projects, Model Airplane News, 251 Danbury Road, Wilton, CT 06897.

TWICE THE FUN!

Here are some sunny scenes from the Sunshine State. Jim Wilkinson of Panama City, FL, sent us these pictures of his scratch-built Sukhoi SU-26Ms (a pair, no less!), which are equipped with smoke systems. Jim is moving into ducted fans. Hope he enjoys "Jet Blast"!



SUPER SMOOTH

This is a real "smoothie." Eric Shults of Andrews University in Berrien Springs, MS, sent us these photos, which he says are "representative of my modeling interests." As you can see, Eric is a talented artist and makes his own pilot for each plane. In addition, he prefers to cover his handiwork with colored silkspan and clear dope in the traditional method. It's great to see it done so well!



THE GANG'S ALL HERE

This shot was taken a few hours before last August's fun fly sponsored by the Simcoe Radio Control Club in Simcoe, Ontario, Canada. Shown, from left to right, are club members Jack Stephens, Vic Gornell, Mark DeVos, Ron Jay, Tony Decoensel, Bud Moyer, Bruce Payne, the "mystery guest," Larry Simmons and Larry Moyer, the club's instructor. The plane is a 1/4-scale Cobra owned by Bruce Payne who submitted the picture.



TOMORROW MEETS YESTERDAY

Although he was born a "few" years after 1939, here's Joey Ortiz holding a vintage copy of *Model Airplane News*. He's sitting near his grandfather's airplane — a Scientific Mercury that's powered by an O.S. Max 40 and dates back to the '30s. Joey's grandpa, John Valls of Laredo, TX, has been an avid modeler and *MAN* reader for over 50 years!





AND THE WINNER IS...

Tom Lazar of Marshall, WI, sent us this snapshot of the A-10 that he built from George Miller plans. The picture was taken at last year's Chicagoland Fun Fly and Static Show where Tom took first place in the static event. Congratulations, Tom!

BEAUTIFUL BIPE

Colorful, isn't it? This picture of a Waco biplane, "Newport Blue," was sent to us by Charles John of San Antonio, TX.

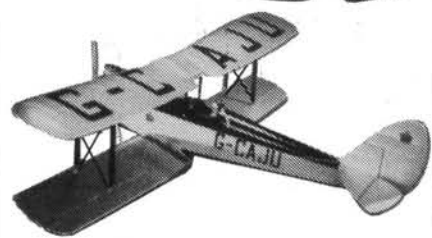
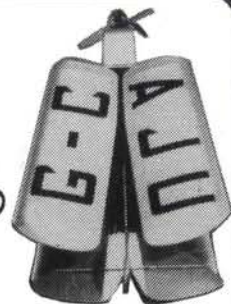
The plane is built from a Pica kit and features an O.S. 1.08 engine and a Zinger 16x6/10 prop. Charles says the plane is extremely maneuverable and "lands like a pussycat." It sure looks like the cat's meow!



CORPORATE CLASS

Mark Frankel sent us this picture of Charlie Lines and his exciting Lear 35A, which is painted in the color scheme of an aircraft based in eastern Pennsylvania. Mark tells us that Charlie is a pilot for U.S. Air and lives in Rome, NY.

Cirrus Moth



- Hand-cut quality, kit includes rigging and scale control setup. All wire parts pre-bent, custom brass hardware and all parts individually identified and packaged. Complete decals.
- Engine sizes 45-50 FS.
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Butch Sicker's Concorde JH-4 A-4 Byron MG
Ed Couch's Folland Gnat ME-262's
Sterner Engineering P-80's Byron's F-16's
Harry Wood's F-16 "Smoker" A-4 Blue Angels
F-4 Phantoms Kfir C2 PAF-8 Cougar
Mark Frankel's Byron F-15 B-52's
F-15 (Yellow Air Prototype)
Mike Kulczyk's Gloster-Meteor

Fiorenze's F-4J (Black Bunny)
Ragel Eagle Tom Streeper's Boeing 737
Pattie Violett's Aggressor Byron Buller
F-14 Tomcat SR-71 (Yellow Air) Darts
F-5's A-4 Skyhawk (Yellow Air) Viper
Lynn McCauley's F-104 & A-10
Byron's prototype F-15
Tom Cook's Starfire and F-4
Ed Couch's FJ-3 Fury

Cloud Dancer's Kfir's
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Byron's SR-71 and F-20
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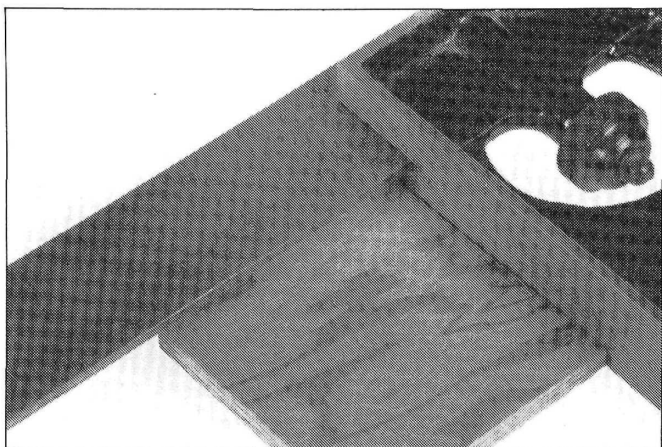
MAKE AN ENGINE-MOUNT DRILL JIG...

How To:

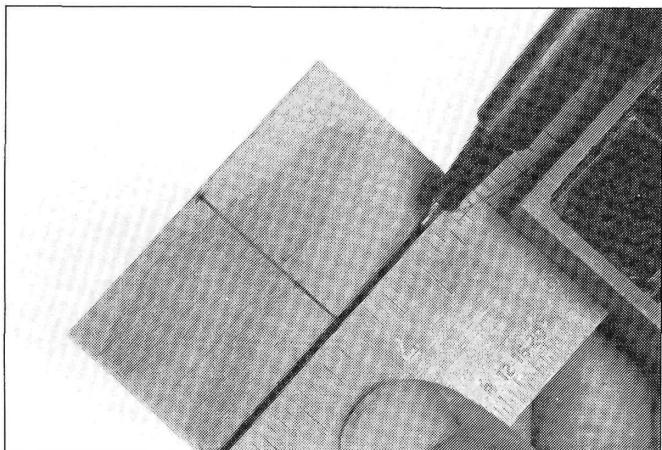
by RANDY RANDOLPH

It's easy if you follow these directions!

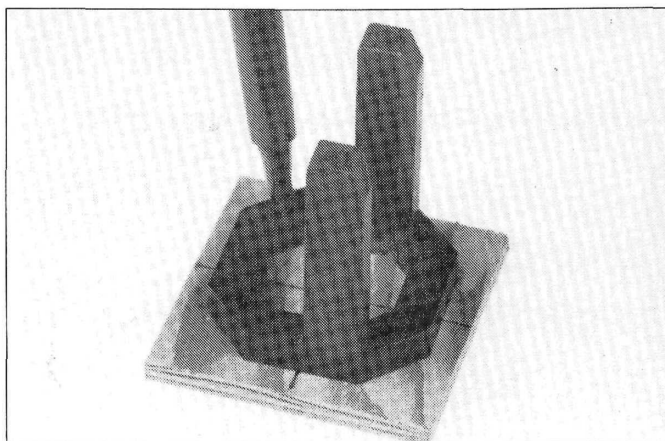
It's sometimes difficult to center the engine mount properly on a fire wall. A jig that matches the mount greatly simplifies the task, and it's almost a necessity for fire walls that have already been installed in the airplane. These photos show the way.



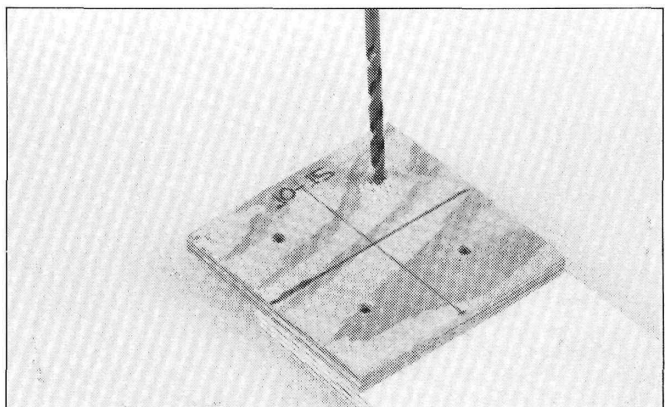
1. Make one jig for each mount. Cut a square of $\frac{1}{8}$ -inch plywood that's $\frac{1}{4}$ inch wider than the outside measurements of the mount. Be sure it's a true square!



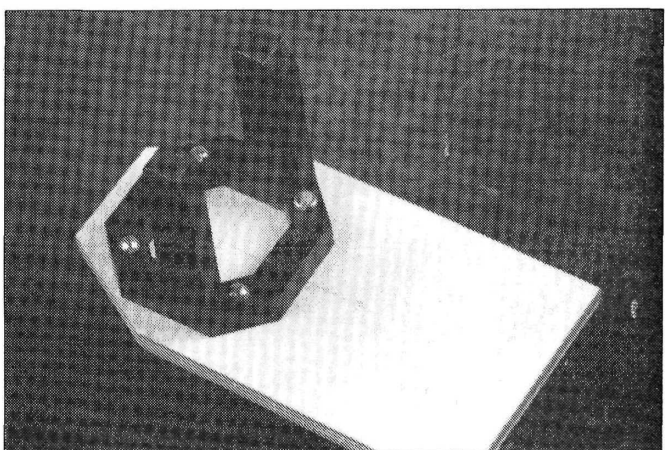
2. Find the exact middle of each side, then use a ruler to draw vertical and horizontal lines across the plywood. The lines should cross in the center of the square.



3. Center the mount on the marked square; the tops of the engine beams should be aligned exactly with one of the lines. Hold the mount in place and make a mark at the center of each hole. Drill each marked spot with a drill that matches the holes in the mount.



4. To drill a fire wall, center the jig on the center line of the fire wall and align the horizontal line with the intended thrust line. After the fire wall has been drilled, install T-nuts on the back to retain the mounting bolts.



5. When the engine is installed, it will be true with the thrust line and the fire wall. Label each jig for the mount it represents.

MID-COLUMBIA SOARING SCALE FUN FLY

1 9 8 9

by WIL BYERS

A sensational soaring event where the mountains meet the clouds!



Gene Cope proudly displays his scratch-built TG-8—a replica of the WW II Piper assault glider trainer. It has a steerable tail wheel, an all-cable control system, struts and three pilots.



Ed Mason with a great-looking F4U Corsair P.S.S. model.

HAVE YOU BEEN looking for something different in R/C soaring? Maybe you should try *scale* soaring. Held in Washington last May, the '89 International R/C Scale Soaring Fun Fly would have been a great place to check out this sport. Seventy-nine pilots, many of whom traveled great distances, entered their 141 beautiful, scale soaring models in this event. For at least three days, models were flown off the slope—that's right, off the slope—and in winds that ranged from 5mph to 35mph.

Just for Fun

Since there was no judging or scoring, everyone was relaxed and in a great mood. Rudy Alleman, a former na-

tional 15-meter soaring champion, gave a slide presentation to demonstrate how full-scale pilots fly. (Maybe Rudy's talk will help to generate some good ideas for next year's Fun Fly.) Add to this a banquet dinner hosted by the Tri-City Soarers (TRIC); a wine-tasting event (compliments of American Sailplane Design and its owner Gary Anderson); and a great raffle, (sponsored by 31 manufacturers and the Tri-City Soarers), and you have all the elements of a successful event.

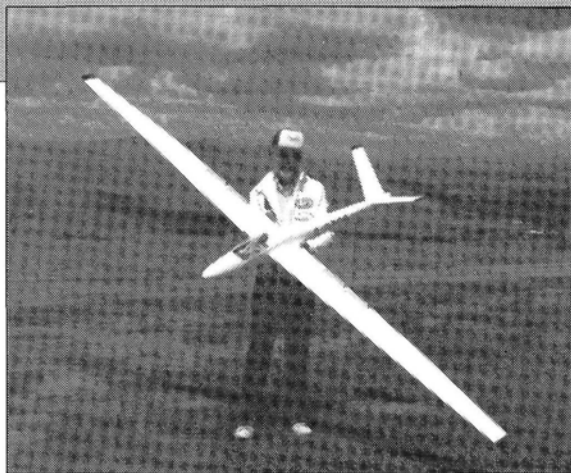
I was really impressed with the quality of the models, but these pilots didn't come here just to display their planes; they were here to fly!—and fly they did, on lift created by a slope that was about 600 feet high and $\frac{3}{4}$ of a mile wide. The alternative site was 1,163 feet high, 5 miles long and faced 180 degrees in the other direction.

Super Soarers

I was really impressed with Erik Eiche's gorgeous Baby Albatross. His details even included a pilot with a knitted cap. The simulated mahogany with its shiny bar varnish finish was abso-



Bob DesShields and Erik Eiche showing two outstanding pieces of craftsmanship: an SG-38 and a Baby Albatross.



Jerry Slates holding Wil's Salto with air brakes open.



Bob DesShields and his KA-6.

lutely spectacular, and the fabric covering looked great. For a few minutes, I was entrusted with the sticks, so I can attest to its gracefulness in the air.

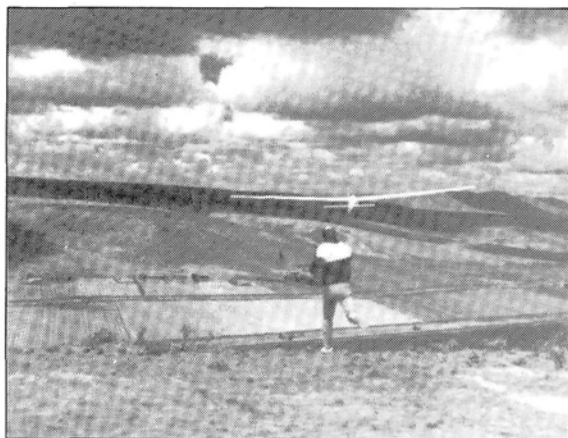
There were other impressive models: Gary Brokaw's 1/4-scale Minimoa from Chris Williams' plans stood out in its red-and-white paint scheme. Its cockpit was beautifully detailed, and Gary aptly demonstrated his plane's soaring ability. Bob DesShield's SG-38, his 1/5-scale Minimoa, and his 1/4-scale KA-6 were all finished to the last detail. His models' life-like pilots and fully detailed cockpits added to the realism of their flights.

Gene Cope flew his Spitfire, a DG-101G, and a very unusual TG-8, which was a replica of a WW II trainer built by Piper for the U.S. Army. Gene attended last year's event, and he's already planning to build a new model for next year. He had some great-looking pilots, who sported handmade ties, jackets, and collars that looked as if they had been starched! Gene's wife did a great job on these uniforms, and she even made a real leather jacket for the pilot of my 1/4-size Salto. (I built my Salto from Jerry Slate's fuselage and plans.) Now do you see why scale soaring is a craftsman's delight and such a joy to behold?

Andreas Shoenebeck, the manufacturer of Fiber Glas Flugel Unlimited sailplanes, came from West Germany to test our lift. His long, skinny, winged beauties are all composite-molded, and they perform beautifully. The speeds of his models range from 15mph to more than 100mph, and they can perform just about any maneuver. At least once during the event, his ASW-20L was spotted at 1,500 feet above the slope, soaring a thermal when all other sources of lift had abated. Andreas insisted that the lift at Eagle Butte and the general condition of the slope were better than those of the Wasserkuppe; that's hard to believe, but I was impressed anyway!

Bill Liscomb's DG-200 model attracted a lot of attention as it carved up the sky, and Bruce Gilbert's AW-52G flying wing was a pleasure to watch. It's such a thrill to see a power slope scale soaring model rush by, venting its kinetic energy in the form of loops, rolls, and inverted flight.

To give you an idea of the variety of models, I'll list just a few: P-38 Lightnings, F-82 Twin Mustangs, Japanese Zeros, a F-5E, a P-40, a F-8F, a T-6 Texan, an A-4, F4U Corsairs, P-51s, ME-163s, a Horten IX, Northrop YB-49, F-



The man who first had originated the scale-meet idea, Bill Liscomb, launches his ASW-15 into thermal-filled sky.



Cockpit of TG-8, by Gene Cope. Notice detail on uniforms.

16, MiG-27, F-20s, Beech Stagger Wing, a Hawker Hunter, and a Westland-Hill flying wing (I think), which all fit into the P.S.S.A. variety.

Here's a list of some of the sailplanes: a DG-600, KA-6s,

(Continued on page 60)

PHOTOS BY WIL BYERS



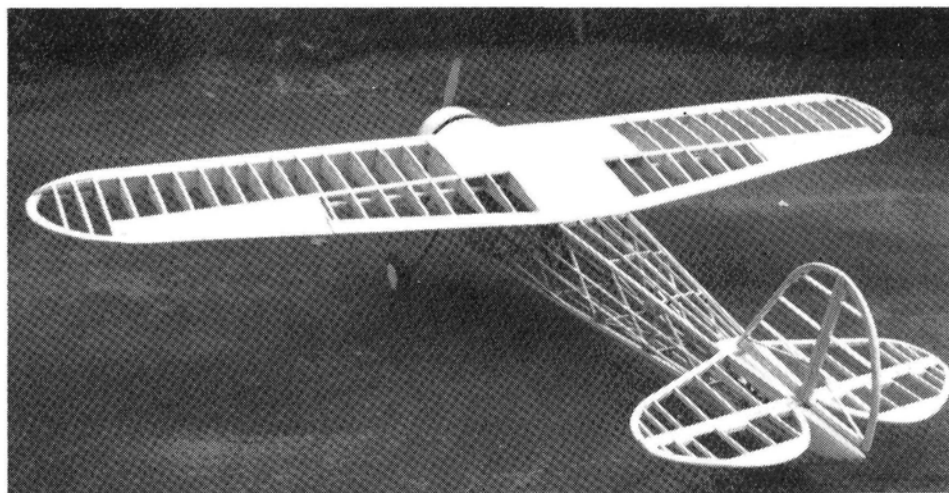
Giant Steps

by DICK PHILLIPS

Plans, ply and powerplants

HAVE A CONFESSION to make. In the past, I've been a little hard on English designers, because, compared with American designers, they make things much more difficult than is necessary. Although I stand by this remark, there's another consideration: English scale plans are hard to beat. Their well-known designers do a superb job of researching model designs, and that research shows on the plans' sheets. A well-done English scale plan is usually a feast for the eyes, especially in the scale detail that's included.

I've recently received two English plans for 1/4-scale models: one is for an 84-inch-span Albatross DVA by Bob Hutton, and the other is for a 97-inch-span RE8 (unfortunately, the designer's name was omitted from the plans). I haven't seen much of Hutton's other work, but this masterly presentation shows that he knows his way around both the airplane and the drawing board.



Bud Carlidge's Cessna C-165 Airmaster. Bud is preparing plans for this fine-looking model, which is designed to fly on a .91 engine. Uncovered, it weighs 13 pounds.

Each plan consists of three well-laid-out sheets. Although these "black-line" reproductions are clear and easy to read, neither plan is appropriate for newcomers to scale-plans building. These sheets have all the details necessary to produce a competitive scale model, but they require some solid experience in building scale models from plans. Because many small parts must be fabricated from metal and wood, both planes are long-term projects, but dedication and patience will produce outstanding results. These aren't the sort of thing you're likely to fall over at every scale contest in the country, either. These good-looking and very complete plan sets are available from Bob Holman Plans.*

Plans...The Alternative

It never ceases to amaze me that so many new plans constantly appear on the market. A few designers—Wendell Hostetler, Jerry Behrens and Nick Ziroli come to mind—continually produce plans, and several suppliers (e.g., Bob Holman, Scale Plans and MAN) market their own and other plans. I find this encouraging, as it certainly provides new subjects for those of us who prefer to build from plans rather than kits. (That doesn't mean I don't build from kits; a number have appealed to me

beyond my powers to resist them!)

Why build from plans? There are several good reasons. The wide range available far exceeds the array of kits. Building from plans allows you to model something different, and it can be much less costly than kit-building. Finding a plan for some rather exotic airplanes is a big plus for plans builders, and if you're a scale addict, you know that having an eye-catching model is important in contest work. It's always a help to catch a judge's eye and pique his curiosity. Even judges become jaded when they see the same models appear at contest after contest. That "oddball" model can often make a difference when it comes to the static scoring table. If the model is flown well, and flown to its maximum capabilities, so much the better for your score.

Each year, I see *many* plans; I've reviewed more than 150 giant-scale plans and, during the next few years, I expect to review at least another 100 or so. It seems that the quality of the plans has improved markedly. There once were some "so-so" plans on the market, but many excellent—and some *extraordinary*—plans are appearing these days. I'm certainly happy about this trend, as it makes some rather exotic model subjects available to those of us who are willing to



When you can make an iron-on look this good, you're ready for an all-aluminum bird. No doubt about it: Bob Francis does fine work!

GIANT STEPS

invest time and effort in building from plans.

Bob Francis from Aptos, CA, recently sent me some pictures of his Curtiss Falcon. I thought you might like to see a truly well-done metallic finish. Bob obviously knows what he's doing when it comes to duplicating metal in a model. He tells me he used Black Baron* Presto, cut into panels and applied in pieces. Rivets were then simulated and three coats of clear enamel were applied over the Black Baron. This certainly makes a fine-looking model! The 97-inch-span Falcon is 73 inches long, weighs 28 pounds, and flies on a Zenoah G-62. Bob uses an Airtronics Vision radio for guidance (see John Lupperger's review in this issue). Bob



Bob Francis poses proudly with his Curtiss Falcon. A great model of a subject that hasn't been "done to death." Note the sharp-looking retract doors on the rear-folding gear.

managed a respectable 4th at the Recent AMA Nats in Washington State, and that's not too shabby for an airplane that isn't truly a WW II warbird!

Bud Carlidge* of Ocean, NJ, sent some pictures of his Cessna C-165 Airmaster. As you can see, Bud is no stranger to the building board, and he was highly complimentary about my book, "Building Big Is Beautiful,"* which he used as a reference while designing the model. The Airmaster is 1/5 scale, spans 82 inches, weighs 13 pounds (bare bones) and has an area of 1,107 square inches. Power is supplied by a Webra .91 with throttle-coupled electronic ignition. The model shown has shock-absorbing gear, but the plans show a standard piano-wire assembly. Bud's model looks great and should fly well at

its finished weight with the available power.

I was pleased to hear about this one, as I know of no other plans for this model; it's a welcome addition to the line of giant-scale plans. The Airmaster was in serial production for a while, so there should be good documentation available for it. Bud has promised to keep me advised of his progress and to provide a set of plans when they're completed. I'll pass along further information on this interesting project as it becomes available.

It's a Bird...It's a Plane...

It's Mighty Lite!

When building models from plans, one of my favorite materials, and one that I use extensively, is what we have come to call "lite-ply." This is actually poplar plywood and falls somewhere between good-quality balsa and good quality, aircraft-grade plywood, and it's considerably lighter than the plywood we usually use. Lite-ply is significantly stronger than balsa, yet it can be worked with modeling knives and saws.

Unfortunately, the quality of the material varies, and it has an annoying habit of warping badly. This is *not* the kind of thing you want to build into a model! Although I've had to discard only very small quantities of lite-ply over the years, I've had to be careful where I used the pieces that weren't first class.

These problems may be solved! Frank Tiano Enterprises* has come up with a material called Mighty Lite, and it's made of the same material as lite-ply, but its quality is far superior. The sample sheet I received is absolutely flat, and both sides are as smooth as the proverbial baby's bottom. I tried to deform it by bending it manually, and I found that it's highly resistant to such treatment. Some of the cheaper grades of poplar ply that I've used in the past have had damaged areas: not so with this material! It seems to be first class. At less than \$4 per square foot (in the 4-square-foot size), it's a bargain, and it comes with a 12-month guarantee! This is the first offer of its type on building materials.

Vibration Isolation

Regular readers of "Giant Steps" know that I'm an advocate of isolating engine vibration from the airframe. I usually use Lord mounts or Wendell Hostetler's air-hose method, which I recently described in this column. Lord mounts are often difficult to find, and many of you have

asked me about their availability. The last time I found them, I bought enough to last a lifetime, but that's not much help to those of you who can't find any. Be of good cheer: There's a solution! J&L Enterprises* now produces a vibration-isolation unit that should do the job properly and hold together.

I use such engine mounts to diminish the amount of "shake" in the airframe. The airframe and the radio gear it contains will survive longer and with fewer problems. If exposed to vibration for long periods, radio equipment is subject to failure. Isolating the radio from that vibration as much as possible is a good idea. Isolation can also prevent failure of the airframe structure.

I thank all of you who have sent me material over the years. This input allows columnists to pass the word along about new plans, new products and new ways of doing things. If you're working on something new and different, drop me a line and I'll see that the rest of the big builders hear about it.

When this column reaches you, those in the snow belt will be in the throes of the building season. I hope the '90s will bring you all the best in our model-building hobby. May the wind be right down the middle of the runway, may all your landings be feather soft, and may your radio never fail you!

**Here are the addresses of the companies mentioned in this article:*

Bob Holman Plans, P.O. Box 741, San Bernardino, CA 92402.

Black Baron; distributed by Coverite, 420 Babylon Rd., Horsham, PA 19044.

Bud Carlidge, 1013 Franklin Ave., Ocean, NJ 07712.

"Building Big is Beautiful"; distributed by ViP Publishers, Inc., P.O. Box 16103, Colorado Springs, CO 80935.

Frank Tiano Enterprises, 2460 SW 85th Terrace, Davie, FL 33324.

J&L Enterprises, P.O. Box 1482, Forrest City, AZ 72335. ■



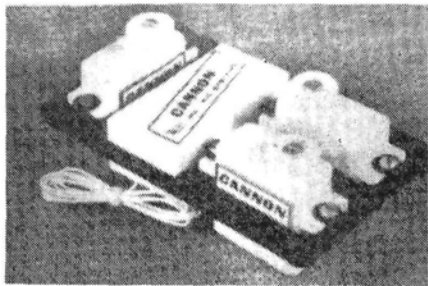
Small Steps

by RANDY RANDOLPH

Radio systems... A look at some of the mini-modulators!

MOST OF US who build small airplanes are very interested in the weight of radio equipment. Actually, weight concerns all modelers, because each additional ounce requires more structure to support it, as well as more power to move it through the air! At the beginning of the year, I wrote to the major radio-equipment manufacturers and requested information on the weight and size of their airborne systems. Only three responded: Futaba, Ace and Cannon!

The following reviews are based on factory specifications, which I've always



The lightest of the light! How about a 3-channel flight pack that's under 3 ounces?

found accurate. For the sake of uniformity, only 3-channel airborne equipment from each of these manufacturers will be discussed; each of the systems reviewed will, however, support one or more additional channels.

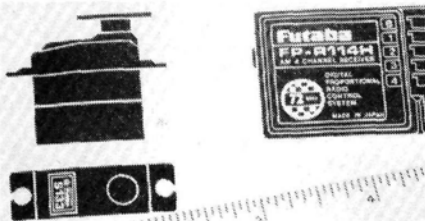
Battery packs and specifications from each manufacturer are listed as part of these lightweight airborne systems, which include switches, wiring and battery connectors. The choice of battery packs is up to you; those listed are simply to give you an idea of what's available.

Cannon Super Micro System

The lightweight champ is the Cannon* Super Micro system, which consists of a 4-channel, 95OR(5)4 receiver and three

CE-9C servos. The single-conversion receiver uses a filter in the IF; this provides the selectivity that will be necessary for the closer spacing of R/C channels in the next few years. It measures .60x1.56x.87 inches, and its overall weight is .57 ounce.

Currently, CE-9C standard and reverse-rotation servos are the smallest available. They measure .453x.97x1.08 inches and weigh .43 ounce. Three of these servos bring the system's weight to only 1.85



The runner-up in the lightness department: The Futaba S133/S33 servo sure makes an inch look big!

ounces. Even including wire, plugs and a 75mAh battery pack, the total weight is only 2.82 ounces. That battery pack will provide about 25 minutes of operation for a very light 3-channel system!

Cannon also offers a slightly larger, heavier system that comprises the Super Nova SN92OR(s)4 receiver and the Nova servos. The Nova 3-channel system, without batteries, etc., weighs 3.8 ounces. The receiver is very similar to the smaller Micro model, except that it uses standard components, rather than the sub-mini jobs employed in the smaller version. The CE-15 Nova servos are slightly larger and somewhat more powerful than the smaller Micros.

In addition to the 75mAh battery pack mentioned above, Cannon offers 100, 270 and 450mAh packs for longer operation between charging.

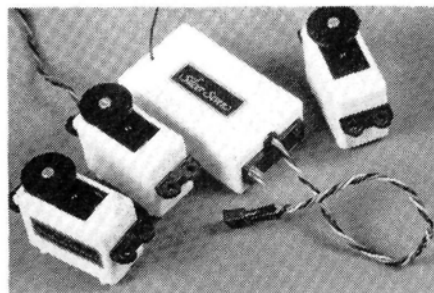
Futaba Lightweight Systems

The Futaba* systems are small, light—and powerful! Although its lightest system is slightly heavier than the Cannon Super Micro, the torque of Futaba's S33

servos is greater than that of the larger Nova servos!

The Futaba FP-R113ip 4-channel, narrow-band receiver measures 1.13x1.69x.63 inches and weighs .72 ounces. The S33/S133 standard or reverse-rotation servos measure .50x1.06x1.12 inches and weigh only .6 ounce! This means that a 3-channel system weighs 2.52 ounces (without batteries and connectors). With the Futaba NR-4G 250mAh battery pack, the total system weighs less than 5 ounces. A full-house system would still weigh less than 5.5 ounces complete, and that isn't bad at all!

A slightly larger system, with even more powerful ball-bearing servos, is still in the lightweight class: it combines the R114H 4-channel 1991 receiver and three S9601 servos. The receiver measures 1.31x1.87x.81 inches and weighs only .95 ounce. The metal-gear, ball-bearing servo measures .62x1.21x1.18 inches and weighs 1.1 ounce. Without batteries, the



This Ace Silver Seven and Bantam servo system is for .60-size airplanes, and it still comes in at less than 4.5 ounces!

system weighs only 4.5 ounces, and it has enough power for .60-size birds.

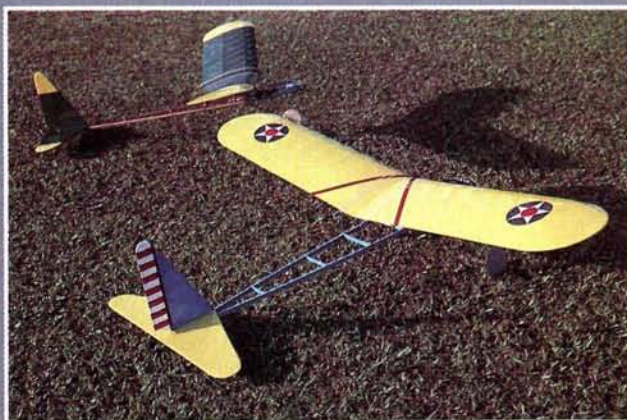
The standard 4- to 8-channel Futaba systems are only a few ounces heavier than those listed. Battery packs range in size from 250mAh at 2 ounces and 500mAh at 3.3 ounces to the big 1000mAh weekenders!

Ace's Bantam Midgets

For many years, Ace R/C* has been doing

(Continued on page 60)

This modern version of a 1936 design uses almost any type of motor to provide laid-back electric flight.



by RANDY WRISLEY

THE FLYING ACES STICK is one old-timer that "just doesn't have it." It doesn't have a complicated built-up fuselage, a tapered wing with many different ribs to plot, or a lifting stabilizer. What the Stick *does* have is a simple construction and good flying characteristics that make it an excellent entry-level electric old-timer. It also makes a great test bed for electric motor and battery combinations.

Designed by Bill Effinger and Tracy Petrides in 1936, the original model was powered by a Brown Junior or a Baby Cyclone ignition engine. At first glance, you might think that with everything "hanging out in the breeze", the Stick would generate excessive drag. It doesn't! Compare its front with that of a typical old-time cabin model and you'll see that the Stick is cleaner. At least, that's the excuse I use when people ask why I built such a strange model! Although its aspect ratio is low, its flat-bottom airfoil doesn't produce the drag associated with an under-cambered section. The Stick penetrates well and can fly further in search of lift. When I blunder into light air, the Stick lets me know by lifting a wing. A gentle turn toward the high side, and up it goes. This old-timer isn't afraid of windy days!

At 35 ounces ready to fly, the Stick is lighter than most electrics. I recommend that you use 800mAh flight batteries, and an electronic speed controller or on/off switch will help tip the scales in your favor as well. Almost any 05 motor (ferrite or cobalt) will fly the Stick. So what are we waiting for? Grab some balsa, spruce, and glue, and let's build one!

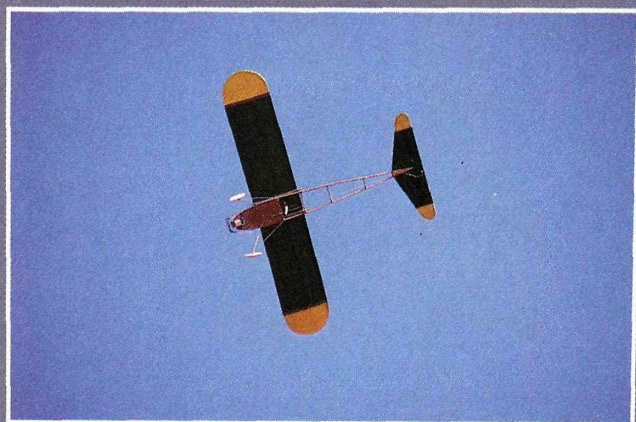
CONSTRUCTION: Start with the tail feathers. Select a medium-hard $\frac{1}{4}$ -inch square balsa for the outlines and spars, and soft $\frac{1}{8} \times \frac{1}{4}$ -inch balsa for the ribs. Pin the outlines

and spars down over the plan. The tips and gussets are flat, $\frac{1}{4}$ -inch, soft balsa. When you've cut them out, glue them into place directly over the plans, too. Remove the completed structures from the board, and sand the outline edges round. Separate the control surfaces with a razor saw.

The wing is next. Using a $\frac{1}{32}$ -inch plywood template, cut out 22 ribs from $\frac{1}{16}$ -inch medium balsa. Lightening holes are optional, but look attractive. Trim $\frac{1}{16}$ inch off the top of the six center section ribs. Pin the $\frac{1}{8} \times \frac{1}{4}$ -inch hard-balsa lower spars down over the plan. Using a balsa stripper, strip four trailing-edge pieces from $\frac{1}{16}$ -inch medium sheet balsa. Trim the outboard ends to match the curve of the wing-tip bow, and pin the bottom trailing edges into place. Each wing-tip bow consists of four 18-inch pieces of $\frac{1}{16} \times \frac{1}{4}$ -inch balsa. Start in the center of the bow, and bend the strips into place, pinning their inside or outside edges, as necessary. Flood the top of the bow with thin CA; trim the ends to length; glue the bow to the trailing-edge bottom and lower spars.

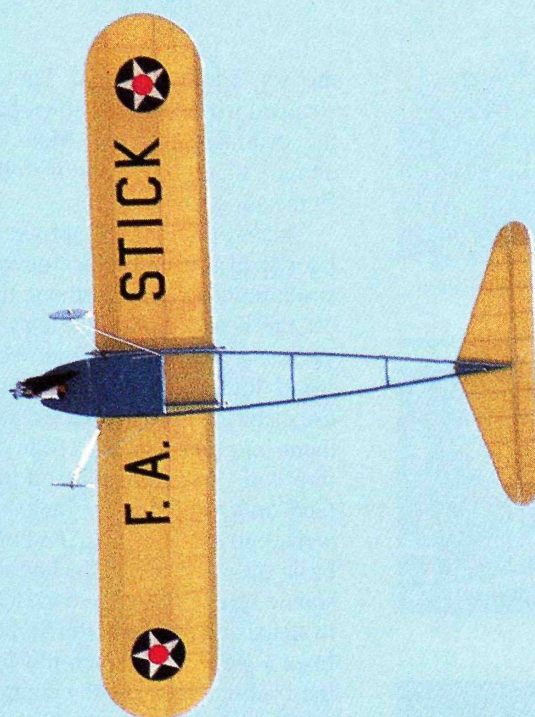
Begin to install the wing ribs, taking care to align them properly. Don't put the two center ribs in place until later. Cut the outboard ends of the top spars to the angle shown. Raise the tip bow $\frac{1}{4}$ inch by placing a shim between the spars. Cement the top spars to the ribs. Saw through the spars at the end rib, and attach them to the wing-tip bow. Install the $\frac{3}{8}$ -inch square leading edge. Add





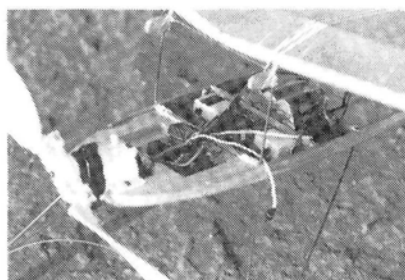
SPECIFICATIONS

Type: Electric old-timer
Span: 60 inches
Length: 42.5 inches
Weight: 34.15 ounces
Area: 573.5 square inches
Wing Loading: 8.6 ounces/square foot
Power Req'd: 05 electric with 7-cell pack
No. of channels Req'd: 2
Materials: Balsa and ply

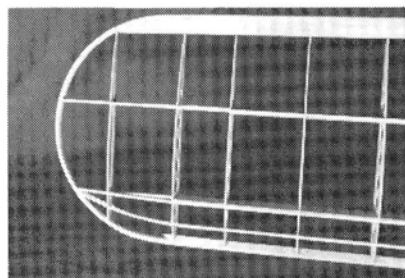


If it weren't for electric power, this picture
 might have been taken in 1936!

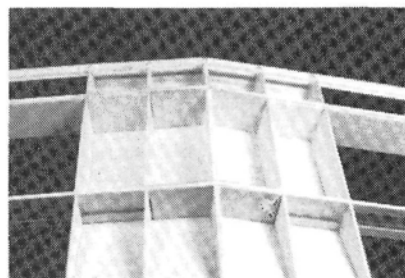
Flying Stick Aces



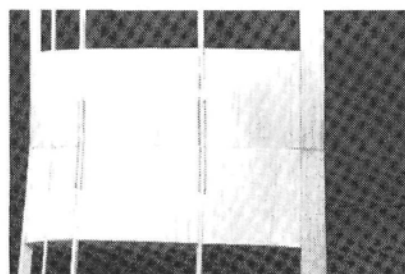
Typical motor and radio installation.



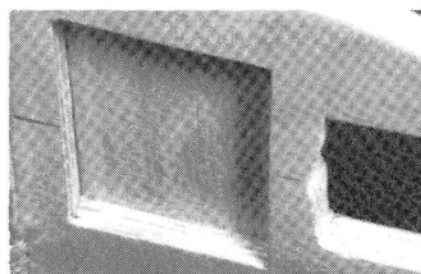
Wing-tip detail.



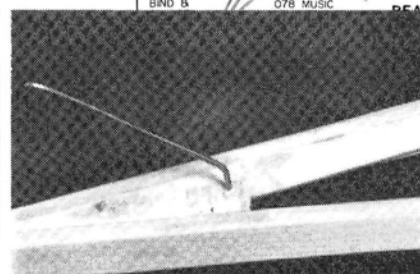
Dihedral braces and shear webs in wing.



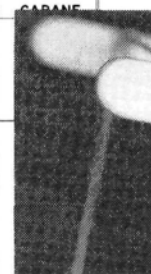
Top of wing showing center-section sheeting.



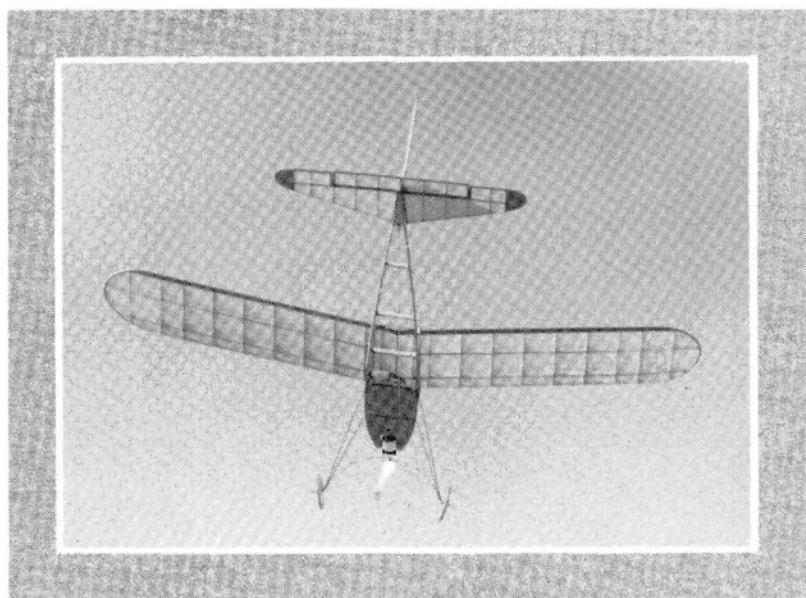
Motor mount showing cutout for speed controller.



Tail skid.



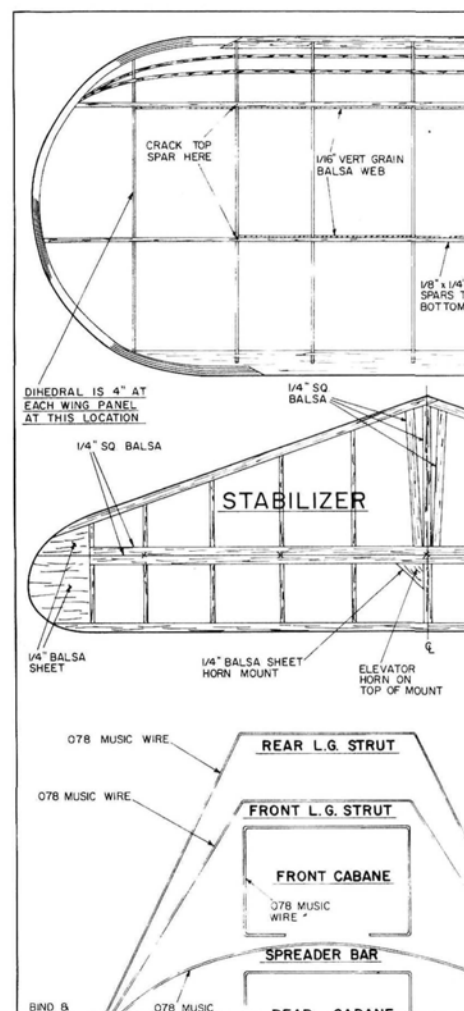
Front cabane cross-brace.

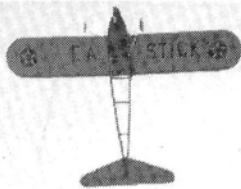


the top trailing edges. The tip rib is stripped from $\frac{1}{16}$ -inch sheet balsa, using the original template. Make the strips about $\frac{1}{4}$ inch thick, and trim the ends to fit the shorter chord.

The $\frac{3}{32}$ -inch square, spruce, top-turbulator spar goes into place now. Once the structure has dried, raise one tip 8 inches off the board. Splice the two halves together, and install the four $\frac{1}{32}$ -inch plywood dihedral braces. Cut the center section ribs into three pieces and cement them into position. Sheet the center section with $\frac{1}{16}$ -inch balsa, on the top surface only. Put the $\frac{1}{16}$ -inch balsa shear webs between the ribs. To complete the basic structure, install the bottom $\frac{3}{32}$ -inch square spruce spar. Carve the leading edge to shape and carefully round the tip bows. Inset a piece of $\frac{1}{32}$ -inch music wire into the trailing edge at the center section to prevent the rubber bands from damaging it.

Before building the fuselage, bend up the wire parts. I'll try to make the task as simple as possible. Start with the wing cabanes, beginning at the bottom left side. Bend a 90-degree angle with a pair of vice-grip pliers. Match the wire to the plan, move the pliers to the next bend line,



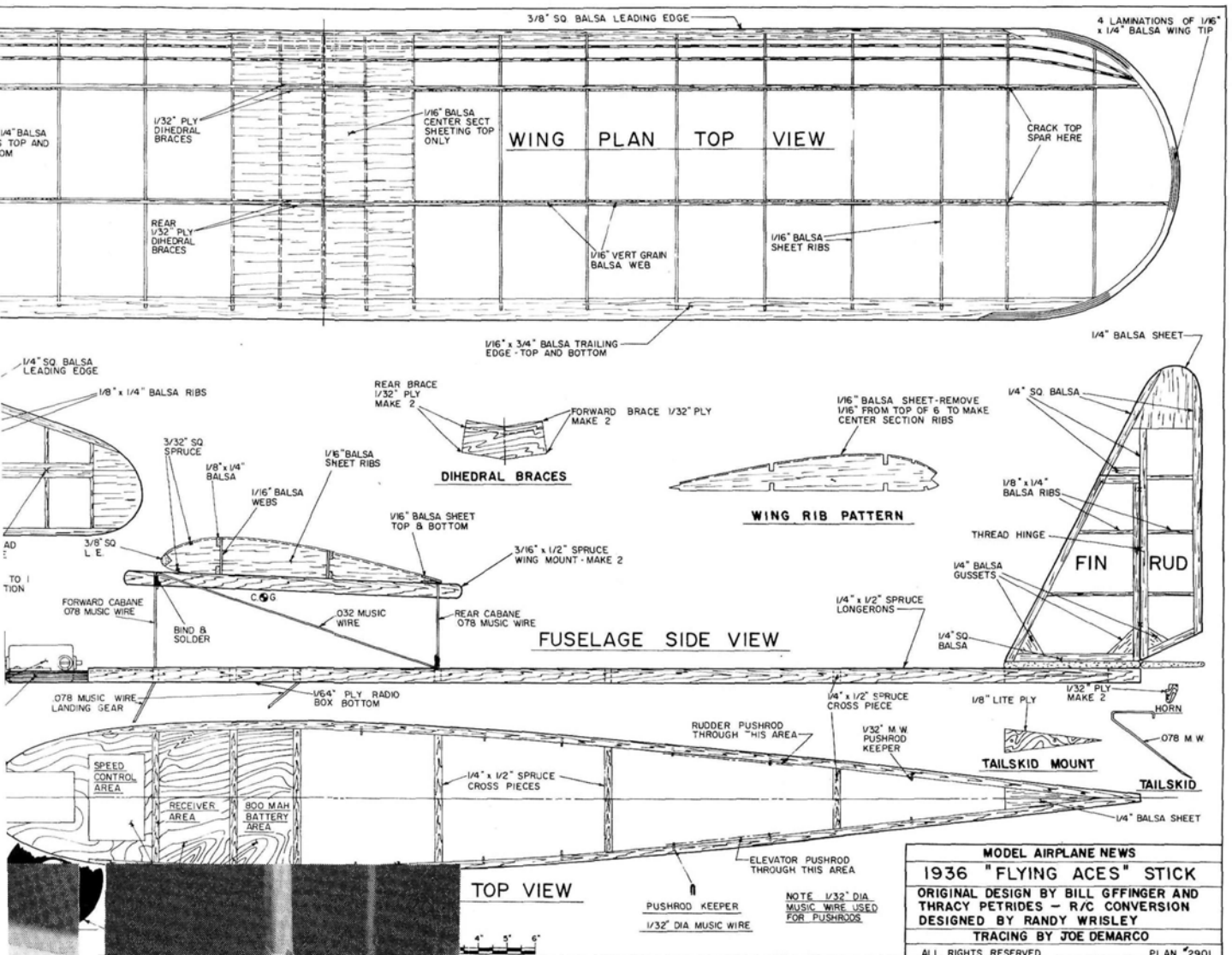
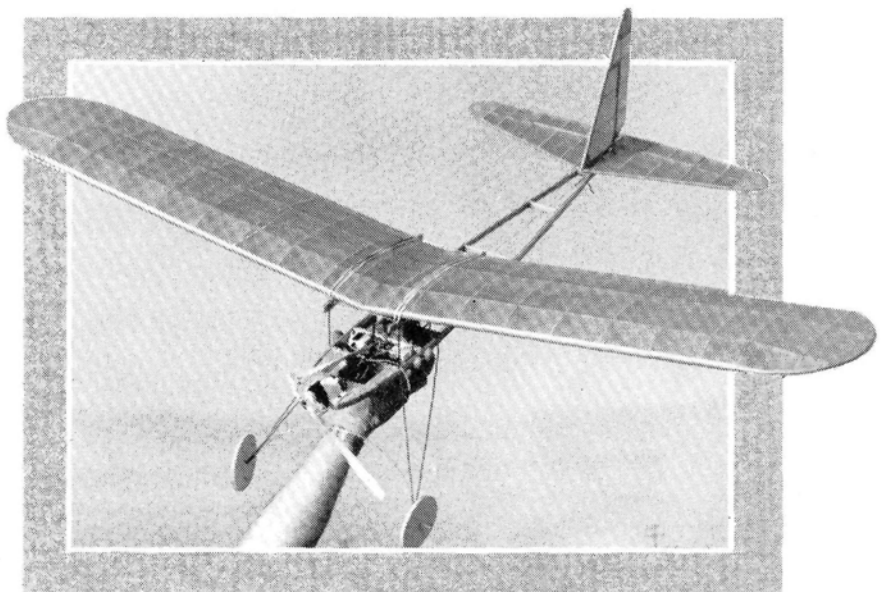


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ORDER THE FULL-SIZE PLANS...PG 116

Pushrod routing and typical wire binding.

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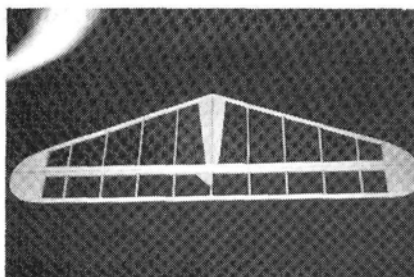
FLYING ACES STICK

What the Stick does have is a simple construction and good flying characteristics that make it an excellent entry-level electric old-timer.

and make the second bend. Sight down the wire, and be sure the bends are parallel when viewed from the side. Match these to the plan and bend the upper, then lower, right sides. All dimensions are plus or minus $\frac{1}{16}$ inch. To ensure the cabane is true, check by laying it on a flat surface. It shouldn't rock at all.

Once you have completed the front and rear cabanes, tackle the landing gear. The spreader bar isn't difficult to make; just bend the curve manually until the part matches the plan. Don't solder the gear together until the pieces have been installed on the fuselage.

The fuselage, or motor stick, is the last item to be built. Start by cutting the motor mount from two pieces of 6mm lite-ply, or four pieces of 3mm lite-ply. Make sure the center line is visible after final sanding. Pin them down over the plan. Cut two 38-inch pieces of $\frac{1}{4} \times \frac{1}{2}$ -inch spruce for the sides. Using slow CA, cement the front inch of each side into place.

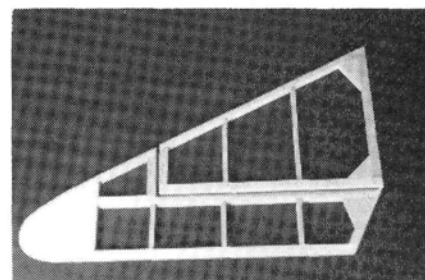


Horizontal stabilizer and elevator.

Begin to flex the sides into place a little at a time; you may have to soak them in a mixture of ammonia and water to soften the grain. I use window cleaner in a spray bottle. When the sides have been formed, trim the excess length off the rear and join them. Make sure the motor mount is still lined up on the center line. Use slow CA to cement the crosspieces into place. Fit and install the $\frac{1}{4}$ -inch balsa stabilizer mount.

Go over all the joints, building up a fillet of CA around the edges. Block-sand the top of the fuselage while it's still on the board, then lift and sand the bottom. Any poor joints will now be obvious and can be filled with epoxy, if necessary.

Make the radio compartment of $\frac{1}{64}$ -



Vertical fin and rudder.

inch plywood, and glue it into place with thick CA. The fuselage can be sanded round or left square. To round the sides, cut a strip of no. 60 (coarse) emery cloth $\frac{3}{4}$ inch wide and about 8 inches long, and use it like a shoe-shine cloth. Sand with progressively finer grades of sandpaper until the fuselage is smooth.

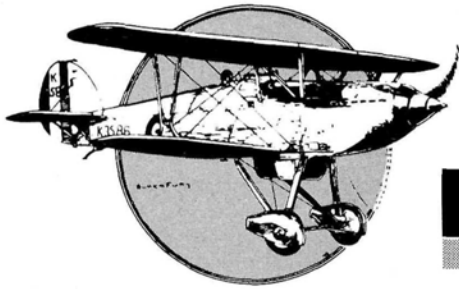
Attach the wire parts to the fuselage in the following sequence: first, lash the rear cabane strut into place with $\frac{1}{2}$ A Dacron control line. Wrap several times to ensure the cabane stays in place, then smear slow CA or epoxy on the Dacron to prevent it from unraveling.

Move on to the rear landing-gear wire. Here you'll have to pre-drill several small holes in the plywood radio box to let the Dacron through. When the gear has been secured, lash both the front cabane and landing-gear wire to the fuselage at the same time.

Take your time. Put the spreader bar in position, wrap the three landing-gear parts together with fine copper wire, and solder. Bend the tail skid, attach it to the 6mm lite-ply tail-skid mount and glue it using slow CA under the stabilizer mount. Finally, solder in the $\frac{1}{32}$ -inch music-wire cabane stiffeners as shown in the side view. Cut the wing-mount rails from $\frac{3}{16} \times \frac{1}{2}$ -inch spruce and lash them into position inside the cabanes. Before gluing, pin the stabilizer into place and check the alignment of the fuselage. You can move the rails up or down as needed to correct any discrepancies.

ASSEMBLY: Cover all of the surfaces before assembly. I've used both Japanese tissue and plastic film; the tissue is lighter, but much more fragile. Several coats of dope will preserve the fuselage. Once

(Continued on page 58)



Fifty Years Ago

ROCKET PLANES, Warbirds AND A FUN FLIER, TOO!

by KEN RUDDOCK



IN FEBRUARY 1940, MAN's cover showed the Republic XP-41—"Uncle Sam's latest pursuit plane." Describing the XP-41, columnist Robert McLaren said, "From prop to rudder, this tiny, powerful weapon of aerial terror is the answer to the question 'Is the pursuit ship dead?' It screams 'no!'"

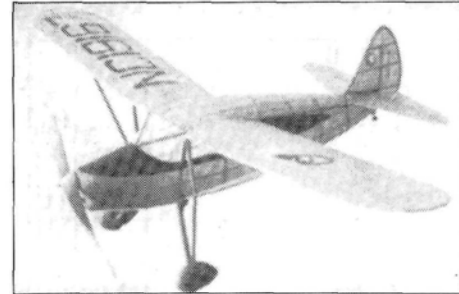
Shades of Buck Rogers

Nick Limber warned his readers that "unless some new form of propulsion is devised, further aeronautical development will be limited—flights into the stratosphere well-nigh impossible." Rhetorically asking, "Is the rocket plane next?" he went on to say, "Through the persistent struggle of far-sighted pioneers, the fantastic dream of rocket propulsion is finally becoming a reality." Although his optimism about operational rocket planes eventually proved groundless, in the '30s and '40s, aero scientists made major experiments that led to the rocket-powered, record-setting "X" planes.

The Rebirth of a Famous Plane

"The success of this ship did much to popularize the sport of gas model flying," wrote Henry Struck of the 1934 K-G developed by MAN Editor Charles H. Grant. Struck offered plans for the KGS, which was an updated version of the K-G. The plane had set a world duration record of 1 hour, 4 minutes, back in the early '30s, and this record still stood in 1940. "What could be more logical, then, than to revise the construction of the old K-G to meet the specific demands of present-day contest flying?" Struck asked.

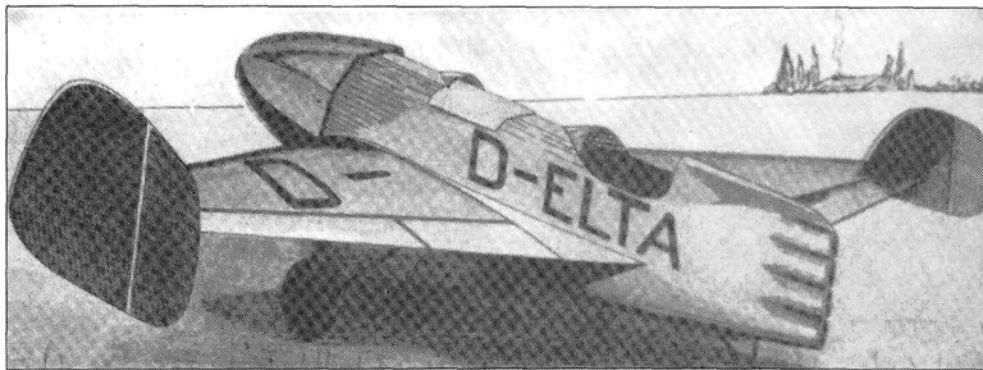
While Struck's article brought back an old favorite, Earl Stahl detailed one of the newer planes—the Fairchild 24-K. Stahl described the plane as "a scale model that will be a joy to build and fly," and said



The Fairchild 24-K was called "the most realistic flier you will ever build."

Designed to Tempt

Between the articles and plans, there were ads for many fascinating new products. Megow Models promoted its Soaring Eagle series—"designed for those who are going after the 1940 championship"—

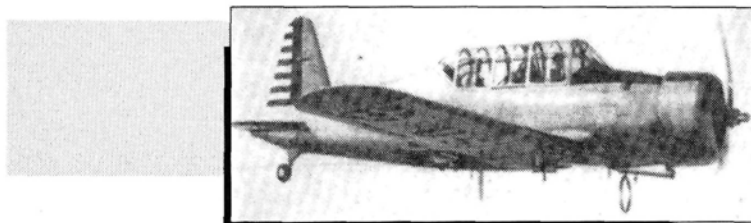


The aircraft of the future? This was a drawing of a "modern rocket plane"—touted as "tomorrow's plane!"

that "progressive designing over seven years has developed a beautiful, easy-to-fly airplane with excellent performance." According to Stahl, the plane wasn't difficult to build, and he described every detail from the fuselage to the propeller to actual flying. "Get out in the wide open space to fly your 24, since it will probably fly in a manner to rival your endurance models," he concluded.

while an all-aluminum racing car "that laps the whole field in speed, beauty and price" was offered by American Super-craft Corporation. The kit, minus motor, sold for an astonishing \$12.50!

In "Frontiers of Aviation," Robert Morrison described the "planes that are fighting the war in Europe." The Curtiss P-42, the Vultee Valiant and Boeing's Flying Fortress were among the American planes shown. Also listed were the German Heinkel, Junkers, and Dornier and the Blohm and Voss torpedo plane fighters. Other fighter planes would soon be heading off to battle—and to the hobby shops of America!



The Vultee Valiant was one of the aircraft described in "Frontiers of Aviation."



The Mustang taking off on its initial test hop. Excellent ground handling, very smooth in the air.

PHOTOS BY VIC MACALUSO & RICH URAVITCH

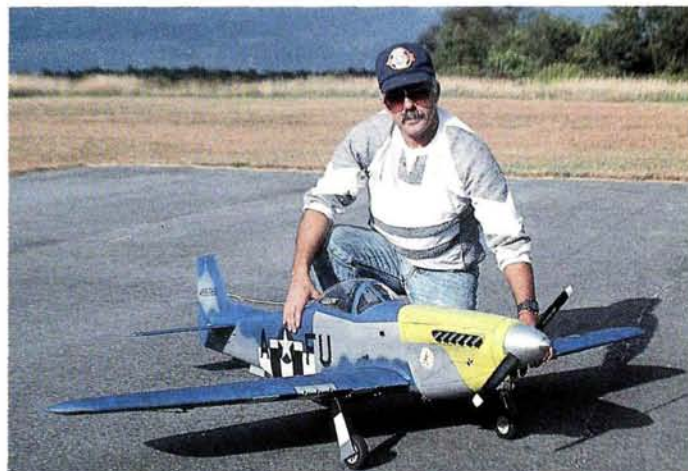
P-51 MUSTANG

Highly prefabricated balsa over foam structure gets this large warbird on the flight line quickly

by VIC MACALUSO

I HAVE A confession to make: I started this review of D&R's* P-51 Mustang with a really bad attitude! I realize that this could make its manufacturer nervous and that you may question the validity of this review, but I'm suspicious of techniques that deviate from usual building practices. This kit is a radical departure from what I consider "normal construction," but read on; there are some pleasant surprises in store.

THE KIT: Some of these pleasant surprises became apparent as soon as I opened the box. There are only five major components in this kit: fuselage, two wing halves, sheet-balsa tail sur-



Vic poses with his newest creation before its first flight. You should have seen the smile on his face afterwards!!

faces and fiberglass cowl. Also included are hardware, sheet balsa, plywood, and a large decal sheet from Major Decals*.

First, I'll discuss the departure from what I consider to be normal construction techniques. Building models with balsa-covered foam-core wings is common, but I was surprised when I saw that the P-51's completely built fuselage was cut from foam blocks and *totally* sheeted with 1/16-inch sheet balsa. Nevertheless, this

sport-scale model still retains the look of its full-scale counterpart.

Although this kit had been stored in my basement for several months, none of the seams had warped—a testament to the kit's quality and workmanship. The most impressive aspect of the fuselage was its incredible lightness. The wings were of similar quality and lightness, and they only required a little sanding to prepare them for final finishing.

Unfortunately, the high



The only things lacking here are the pilot figure and retracts. Classic lines of the '51 are captured well by D&R.

SPECIFICATIONS

Type: Sport scale

Span: 75 inches

Weight: As built, 13 pounds

Area: 1,050 square inches

Wing Loading: 280 ounces per square foot

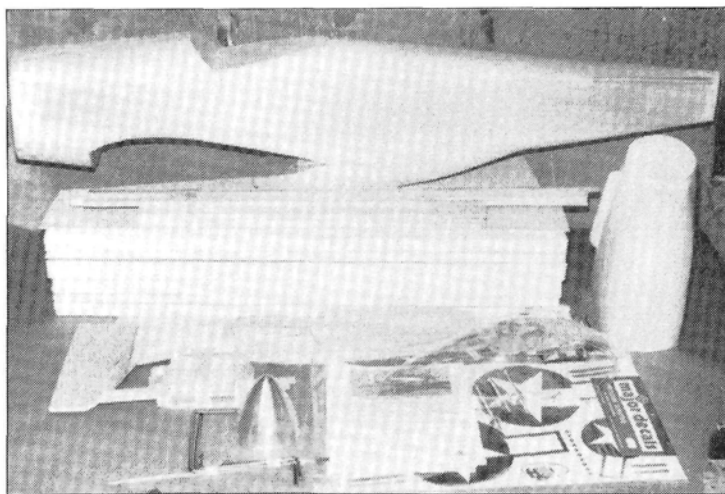
Power Req'd: 90 to 1.08 2-stroke; 120 4-stroke

No. of Channels Req'd: 4 to 6

Suggested Retail: \$239.00

Features: All-foam construction with $1/16$ -inch sheet balsa covering.

Comments: The P-51 is a great flier. It's light and goes together quickly.



All components as they come out of box—quality ranges from excellent to poor. Manufacturer has made some modifications (see text).

quality of the fuselage and wings wasn't found in the wood that was supplied for the tail surfaces. Although these parts were shaped well, the grade of balsa was too heavy. Since any weight saved behind the CG results in a lighter model, I decided to cut eight $2\frac{1}{4}$ -inch lightening holes in the stab and fin, and this reduced the weight by 6 ounces. I called Roger Tumlinson at D&R, and he assured me that this problem had been corrected.

The hardware package was complete, and all the necessary items to finish this kit as designed were included. I made some modifications that eliminated some of this hardware, and I bought some additional items. (I'll discuss these modifications later on in this review.)

The most impressive item in the hardware package was the spun-aluminum spinner from JG Manufacturing*. Unfortunately, this was another good quality/bad planning situation! While the quality of the fiberglass cowling is good, the supplier (not D&R) misread some of the dimensions, and this resulted in a $4\frac{1}{4}$ -inch cowl nose ring and a 4-inch spinner. This can be easily cor-

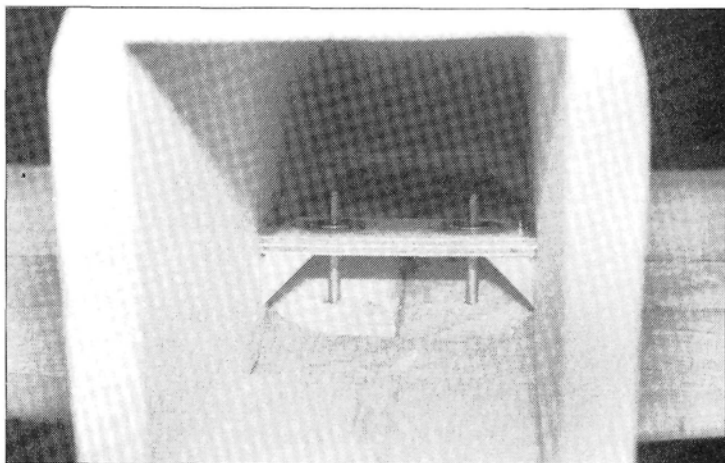
rected, however, by adding a ply nose ring to the cowl, or by doing what I did: Just ignore it. It's hardly visible from 5 feet away, and you can't see it at all when the plane is airborne.

CONSTRUCTION: Construction is straightforward and requires no special skills. The 13-page manual is detailed, and the explanation of rigging and flying is thorough.

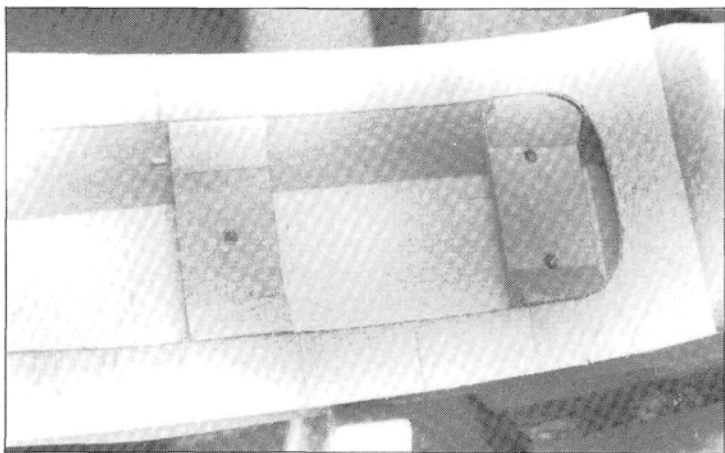
If you worked on this plane in the evenings, it would take you about seven nights to prepare it for finishing and rigging. Those who are new to the hobby may not realize that most CAs aren't compatible with white foam, so if you decide to use CA, go with Satellite City's* U.F.O. line.

Because this is a large model, the wing loading isn't very high, and just about any finishing procedure can be used without adding too much to the overall wing loading. If you want a knock-out finish, use glass, but if you're like me—always three projects behind—try the iron-on coverings. I covered the entire model (including the fuselage) with Worldtex.

After sealing all the seams



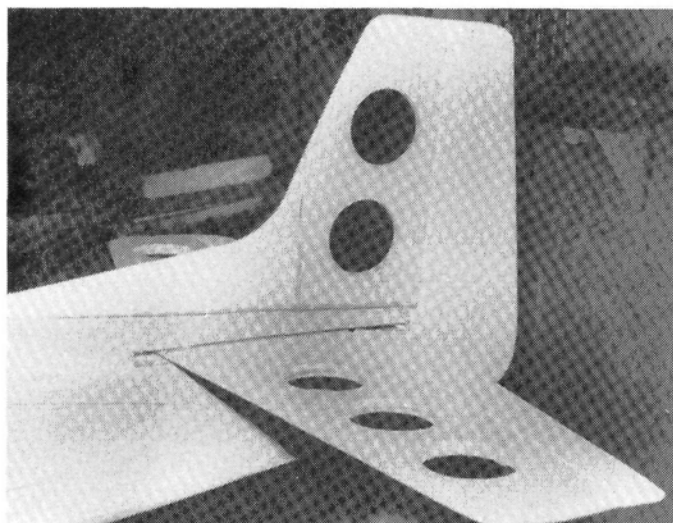
Wing-mounting bolts in place.



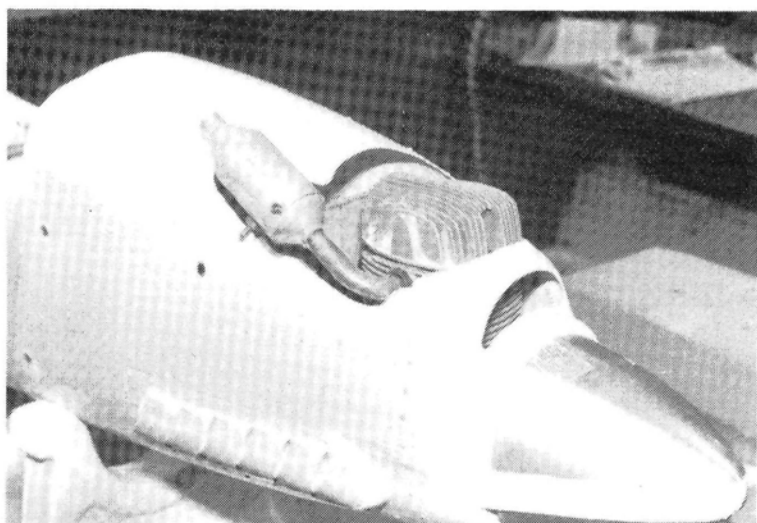
Wing mounts glued into fuselage.

with CA, I applied two coats of primer and sanded the Mustang to a perfect finish—a quick and easy technique that I'd never used before. For a finish that was easy to achieve, I chose

P-51 MUSTANG



Lightening holes in these tail components saved 6 ounces behind the CG and at least 6 ounces ahead of the CG.



Cowl, motor and spinner all come together at this point.

Hobbypro's* flat-finish paint with a weathered look and its flat hardener (see photos).

RADIO INSTALLATION: Standard servos will control this aircraft, and any radio will fit. Although this is a large model, it's relatively light and designed to fly with the basic four channels. If you decide to get fancy and install retracts and flaps, these features are detailed in the construction manual, and you should have no trouble.

MODIFICATIONS: I made two modifications to this kit. There was nothing wrong with the original design; I just prefer to do certain things *my* way!

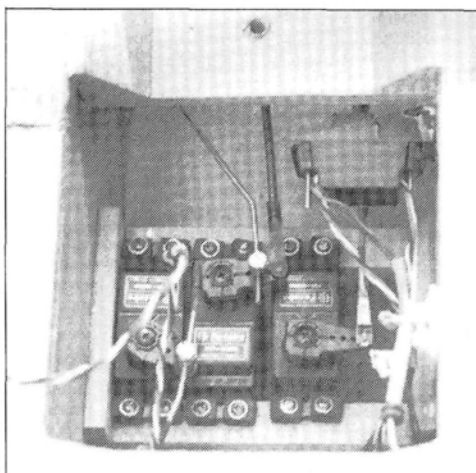
The first change was purely cosmetic. For a more scale-like appearance, I made the wing tips of foam and then covered them with Worldtex, rather than make

that the pull/pull cable-type control system supplied with this kit is superior, but it sure looks ugly on this ship. With 1/4-scale Nyrods, I achieved

down the runway as if it were on rails. In fact, once the tail came up (about 30 feet), no rudder was needed to keep it right on the center

line. I deliberately kept the plane rolling on its mains to build up speed, and when I relaxed the slight forward pressure on the stick, the P-51 took off as if I had flown it many times.

The climb-out was straight and steady; one might even say, majestic! At 13 pounds, the wing loading was



There's plenty of room for radio installation.

about 28 ounces per square foot, which is moderate for any powered model, but light for a model of this size. This relatively light wing loading translated into performance that really surprised me!

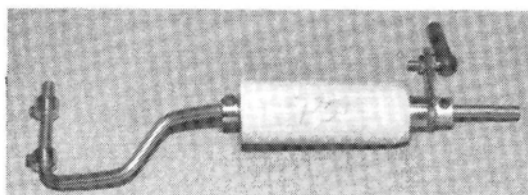
I wanted to take photographs, so I flew the Mustang low in tight turns. This first flight tested the low-speed flight performance (excellent) and my nerves (not as excellent). Once the "insurance" photos were out of the way, I started to fly this plane like the WW II fighter that it was. I used an

the precision needed for this type of model, and I also had the look that I wanted. Remember: These modifications were made out of preference, not necessity.

PERFORMANCE: I don't know about you, but I've rarely had a model fly "off-the-board" for the first flight without some kind of minor excitement. After running the motor and making sure that the radio was OK, the moment of reckoning arrived, and was I surprised! With only minor rudder corrections, this model tracked

them by covering the sheet-balsa tip with Worldtex.

I made the second change because I prefer a pushrod-type control system. I agree



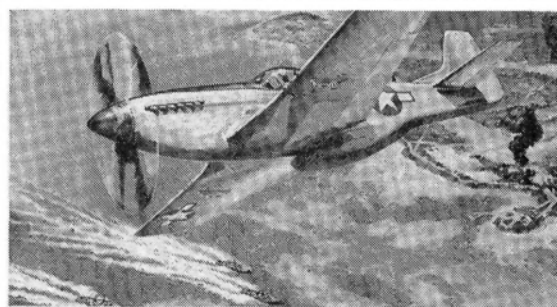
Vic made up this tail-wheel strut for a more scale appearance/location.

WHY ANOTHER MUSTANG?

by KEN RUDDOCK

PERHAPS NO other WW II plane has captured the imagination of aviation buffs and modelers more than the P-51 Mustang fighter. At least 12 Mustang kits have been produced, ranging from 12-inch versions to models with 100-inch wingspans. They have been realistic and faithful reproductions of the famous fighters; but why the Mustang? Perhaps it's the mystique of the name stemming from the wild, free mustang horses of the West—the same name that put a small Ford in the limelight in the '60s. It may just be its excellent war record.

The North American P-51 Mustang was designed in 1940 and first used by the British. It served in nearly every active combat zone during WW II, including the Pacific, where it accompanied B-29s to Japan from Iwo Jima. In Europe, the P-51s destroyed nearly 5,000 enemy aircraft in the air—more than any other Allied fighter plane.



Packard-built 12-cylinder engines power the Mustang before, during, and after the war. The engine is shown in the foreground, with the Mustang in the background.

What every motorist can learn from a Mustang pilot

Every Mustang pilot knows the simple truth: that any engine—no matter how much power it produces—must be able to handle the power that comes to it. The Packard-built 12-cylinder engine is a perfect example of this.

There is a lesson to be learned from every Mustang pilot. The lesson is that the engine must be able to handle the power that comes to it. The Packard-built 12-cylinder engine is a perfect example of this.

There is a lesson to be learned from every Mustang pilot. The lesson is that the engine must be able to handle the power that comes to it. The Packard-built 12-cylinder engine is a perfect example of this.



The mighty Mustangs were powered by Packard-built Rolls-Royce engines. Just "ask the man who flew one!" This Packard ad, picturing a Mustang fighter, dates from May 5, 1945.

During the Korean conflict, P-51Ds were used to closely support ground forces, until they were retired from combat in 1953. Since the early '50s, a

number of Mustangs have been restored and are in both private and museum collections, including the United States Air Force Museum in Dayton, OH.

OPS* 120 4-stroke for power, and it pulled this model with authority and in a very scale-like manner. Loops were accurate with good tracking, and axial rolls were performed with very little elevator/rudder correction necessary to maintain heading and altitude.

I made the set-up for final approach and landing as if I'd flown this aircraft many times—that's how easy it was to fly. I didn't expect the P-51 to float as much as it did on that first landing, so I had to make two additional passes before I set it down. The is a "clean" model, and I had to reduce the speed considerably before I landed it. By no means was this a problem; I simply misjudged my speed, because I'm used to planes with higher wing loadings.

The P-51 was a joy to build. It was quick, easy, and certainly different! Not only did it look like the real P-51, but it also flew like one. The quality of the kit was good, although it needed a few improvements—but don't they all? The P-51 looks like a winner and flies like one!

*Here are the addresses of the companies mentioned in this article:
D&R Aircraft Mfg., P.O. Box 299, Gonzales, TX 78629.
Major Decals; distributed by Northeast Screen Graphics, P.O. box 304, E. Longmeadow, MA 01028.
JG Manufacturing, P.O. Box 6014, Whittier, CA 90609.
Satellite City, P.O. Box 836, Simi, CA 93062.
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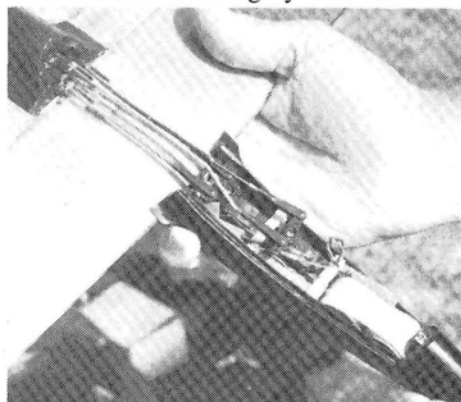
Quiet Flight

by JOHN LUPPERGER

EACH MONTH, I RECEIVE several letters about the column. Most have a question or two about building or flying; some are announcements from clubs; and some are "thank yous" for some hint or information I've provided.

The ones I've enjoyed most concerned "Project Wanderer." The building, finishing and modifying of the Wanderer stretched over four or five issues. From the letters, it seems that I took too long to complete the project and that many people tried some, but not all, of the modifications.

Therefore, the next "project" plane will be started and completed in the next three issues. I know what it's like to want to get a new plane into the air, but I think this time frame will be good for beginners who are ready to move up in performance from the Wanderer. Before I tell you what model I've chosen, however, here's a letter from Ken Gregory of British Co-



Diminutive size of Armànd's sloper is evident in this shot. Radio gear and linkages are definitely a tight fit.

lumbia, Canada. It typifies the letters I received on "Project Wanderer."

"I appreciated your column that described modifications to the Wanderer glider. I had a kit on hand and built it as you described, except for the tip spars, for which I followed the plan. I built-up and squared-off the horizontal stabilizer. I used an Airtronics* Mini BB 831 servo for the spoiler and placed it under the hatch between the two Airtronics Standard 631 servos. I put the 500mAh re-

Upcoming project plane and new-generation jet slopers



Byron Bruce of Combat Models holds two of his three new slope models. The MiG-27 and A4 will be joined by an A-10 Warthog. Simple 2-channel PSS models fly on aileron and elevator controls.

ceiver battery in the nose. Result—the CG came out "bang on" with no lead needed. Total weight—23 ounces!

"My first flights were slope flights (incidentally, this was my first attempt at slope soaring). I got eight minutes and a heavy landing downwind—with no damage. I've since had two thermal flights, and three or four slope ones, each of more than 20 minutes. The spoilers are great for a beginner—not too vicious—and the elevator will hold against them. I've done two years of power flying and am now in my third year of R/C. I find soaring much more satisfying.

"I'm eyeing the Sailplanes International* Osprey 100. Do you plan to do this one in your column?" (*The Osprey will probably be reviewed in a future issue—JL.*)

"I think that you hit on a much-needed format when you did the Project Wanderer. Another one or two on other kits under \$100 would be greatly appreciated. We beginner soarers don't want to get into

fiberglass fuselages or vacuum-bagged wings yet, but we would like a sailplane a little ahead of our abilities, at a reasonable cost. Your improved-kit approach is great, and very interesting."

Thanks for your comments, Ken. I hope you'll join us in the next project model and enjoy it as much as the Wanderer.

Project Sophisticated Lady

You guessed it—our next project model will be the Goldberg* Sophisticated Lady, which I picked because it represents a step up from the Wanderer in building difficulty and performance.

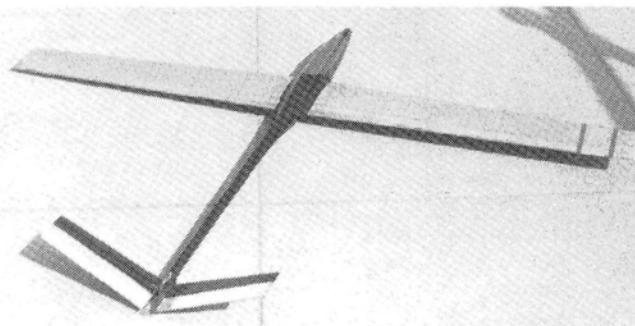
The Sophisticated Lady is a very good model in its stock form, but modifications will make it stronger and improve control and performance. I'll start next month with the tail surfaces and the fuselage, so get your kit, punch out the necessary parts, and read through the instruction booklet.

Small Slope Soarer

There's a small slope in Long Beach, CA,

right on Ocean Blvd. in the heart of downtown. When you stand by the railing at the slope's edge, a strip of grass about 40 feet wide (the landing area) lies between you and the road. The slope is only about 50 feet high, and it produces a relatively narrow band of lift. If you're like most slope fliers, you want action; this means a hot sloper capable of high speeds and aerobatics. This also means high winds on a big slope with a lot of lift—not the slope I just described.

Armand DeWeese flies at this slope and wants to fly in the aforementioned manner. With the limited lift available at



Armand DeWeese's great-looking, little V-tail sloper is one hot performer. Three-function model uses only two channels to control the ailerons and the coupled elevator and flaps.

Ocean Blvd., Armand realized that he wouldn't get the performance he wanted from a conventional slope kit. Solution: Armand designs his own ships.

The model I saw Armand flying didn't have a name, but it certainly impressed me. The model has a 40-inch span with only 140 square inches. Its all-up flying weight is 11 ounces, yielding a wing loading of 11.3 ounces per square foot. The model has vacuum-bagged, foam-core wings using a Jack Chambers 13 airfoil. It's controlled by ailerons and coupled elevator and flaps.

The real surprise comes when Armand tosses his little lightweight beauty over the side. Even though the model looks clean, I had no idea it would be so fast and groovy. Turns with the coupled elevator and flaps are unreal! The model seems to stop and pivot, but it doesn't really lose air speed. If Armand built a larger version, I think he'd have a very potent racer. Unfortunately, because of the building techniques involved, I couldn't interest Armand in writing a construction article. For those who have the necessary skills, however, it shouldn't be difficult to make a similar model by referring to the pictures.

New Slope Kits

Byron Bruce of Combat Models* has decided to add three new slopers to his product line. The all-foam F-16 has been very popular, but it needs a lot of wind to fly. The new PSS models use a thinned, 7-percent Eppler 374 airfoil, which, even though it's a thin section, helps the models to fly in a greater range of wind conditions.

The new models include: an A-10 Warthog (49-inch span, 361 square inches); a MiG-27 Flogger (45-inch span, 315 square inches); and an A-4 Skyhawk

(43-inch span, 266 square inches). All three models require two channels on aileron and elevator.

As you'd expect, the A-10 is the easiest to fly with its greater wing area and "draggier" design, so it's a good choice for your first high-performance sloper. For those with well-developed flying skills, either the MiG or the A-4 would be a good choice; the A-4 is hotter because of its smaller wing area.

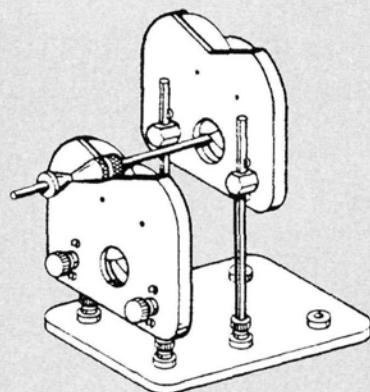
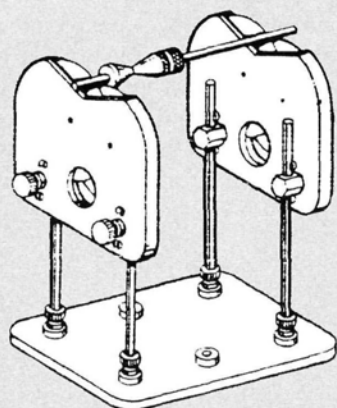
These are welcome additions to the ever-growing category of PSS models. They retail for \$114.95, but can be found for about \$80 or \$90, if you shop around. The kits contain precision-cut foam cores, balsa and hardwood. Their fuselages are built-up with formed canopies, and basic hardware is included.

Balance Those Props

Du-Bro* recently introduced its affordable Tru-Spin Prop Balancer. This is a great product that every electric flier should own. In the past, unless you were willing to spend a lot of money for an all-metal, chromed and anodized prop balancer, you had to be satisfied with the type you held between your fingers. I've used this type for several years, but I never really felt that my props were well-balanced. If you fly high-performance direct drives, a balanced prop can save your motor. I've seen an out-of-balance prop bend a motor shaft, and in the long run, even a slightly out-of-balance prop can destroy your motor's bearings.

Du-Bro's unit has two balance-wheel housings that are mounted on adjustable legs. The balancing shaft with cones can be placed on top of the wheels for small props, or on top of one unit and in the middle of the other for large props (which would then hang over the edge of your

(Continued on page 65)



Tru-Spin Prop Balancer from Du-Bro can be used in different positions to accommodate all sizes of props. Balancer is great for electric folding props and for balancing spinners that have been cut to fit folder hubs.



Jet Blast

by Guest Columnist BILL HARRIS

VIOLETT WINS THE SCALE MASTERS! JETS ARE IN!

AS A HOPELESS "fan-atic," I eat, sleep and breathe ducted fans, and I love every second of it. I've been involved with jets since 1980, when it was a big deal just to get one off the ground, and today, sport jets are capable of some pretty spectacular departures. (*Editor's Note: as in "takeoff," not as "from controlled flight."*) I'm often asked how to obtain a good needle-valve setting. It isn't that difficult; you just have to remember what works best on certain types of engines. Whether you have a remote needle setup or use the stock carb needle, the engine still "sees" the same allotted portion of fuel that mixes with the incoming air to produce the rich to lean setting you want.

Certain engines have settings on the

ground that produce a good "run" in the air. The engines that I'm most familiar with seem to set best as follows: The O.S.* Max and Bob Violett's KBV* engines (and the smaller .45-size engines) should be set a little down from peak, so if you momentarily squeeze the fuel line, the rpm should rise to about 500 to 700.

Rossi* and Picco* engines shouldn't be set this way, because they'll be so rich in the air that you may not be able to continue the flight. For a good run upstairs, Rossi and Picco engines should be set very close to maximum rpm on the ground. Of course, bad settings can now be avoided by using in-flight mixture controls. Jet Model Products* and Bob Violett Models have excellent in-flight mixture controls. It's always better to be

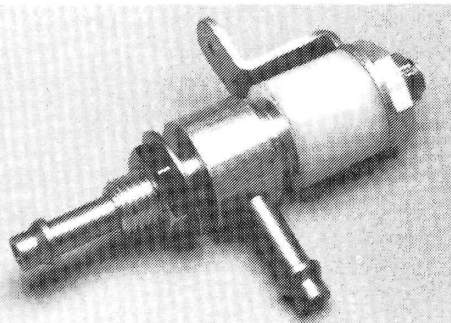
a little on the rich side than to "cook" your motor. At the price of a piston and sleeve replacement, you can "sneak up" on that optimum setting for your setup.

The U.S. Scale Masters Championship was held in St. Louis, MO, in October, and I couldn't help but notice the six scale jets. Two singles and four twins were on hand, and Bob Violett won this year with his F-86 Sabre Jet. His smooth flying and good static score were a winning combination. Congratulations to Bob for a much-deserved win.

For you fans of smaller fans, I have it on good authority that a couple of major manufacturers are hoping to add some smaller units to their lines. Two friends, Terry Best and Paul Applebaum, have been working on the smaller jets for



This trio of Jet Blasters stopped off at McDonnell Douglas on their way to the Scale Masters competition in St. Louis. Left to right: Bob Fiorenze with his F/A-18 Hornet; our guest columnist with his F-15 Eagle; and all-round good guy, Charlie Chambers with his Hornet in Blue Angels livery.

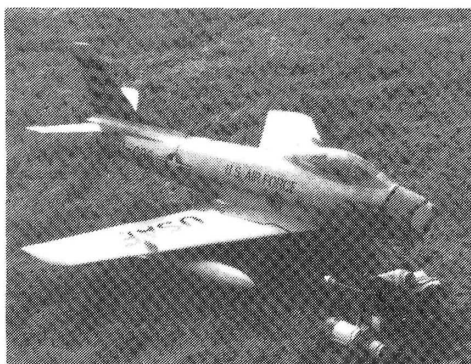
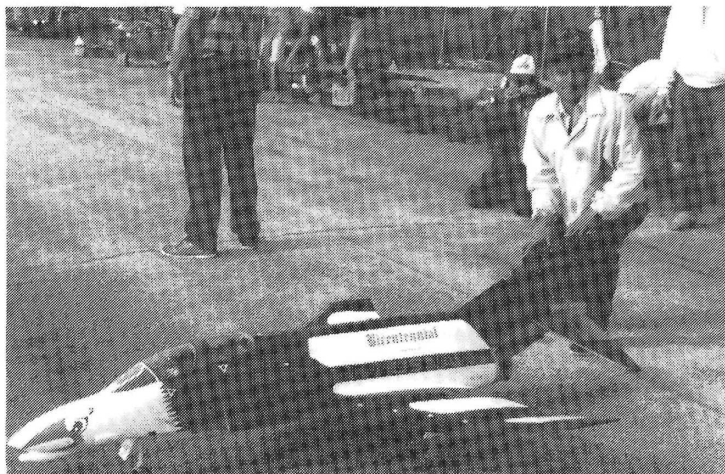


In-flight mixture control ensures that you can make adjustments to accommodate fuel-pressure variations. This one is available from Jet Model Products.

some time, and the performance achieved is outstanding! Terry has designed a small, high-performance sport plane that he's dubbed the "Invader," and word has it that plans will soon be available for it. The Invader is a .45-size, retractable-gear speedster that's capable of speeds in the mid-150 to 160mph range.

The last fan fly in my neck of the woods was held in Metropolis, IL, and it was dubbed the "Superman Fan Fly" (what else?!). Hosted by Jerry Caudle, the list of registered pilots for this first annual event was long and impressive. I'll try to

Shailesh Patel parked his Jug and Hellcat to take time out to compete at the Scale Masters with his colorfully marked Bicentennial Phantom.



The F-86 Sabre of Bob Violett awaits the pin. Patience and practice paid off—Bob won! Full "Field & Bench" in last month's issue.

have a short review and some photos for next time. If you have any questions or news, send them to Editor Rich and he'll forward them to me. If I don't have the answers, I'll make up something! Until next time, make some jet noise.

**Here are the addresses of the manufacturers mentioned in this article:*

O.S./Great Planes Model Distributors, 1608 Interstate Dr., P.O. Box 4021, Champaign, IL 61820.

KBV, Bob Violett Motors, 1373 Citrus Rd., Winter Spring, FL 32708.

Rossi USA, 2178 Forest Ave., Staten Island, NY 10303.

Picco Engines; distributed by Andes Hobbies, P.O. Box 3077, Laguna Hills, CA 92654. ■

CONTRIBUTORS WANTED

We think many of our readers have ideas that are worth sharing. How many times have you read an article and said, "I could do that!" or "That's not the only way to do that; my way is easier!" Could be!

Here's your chance. We're expanding **Radio Control Car Action** and are looking for additional contributors to help us accomplish this objective. Of key importance are good photographs; the writing we can help you with. Interested? It's much easier than you might think!

Let's hear from you. Send in your article ideas and a few sample photographs. We're looking forward to seeing them.

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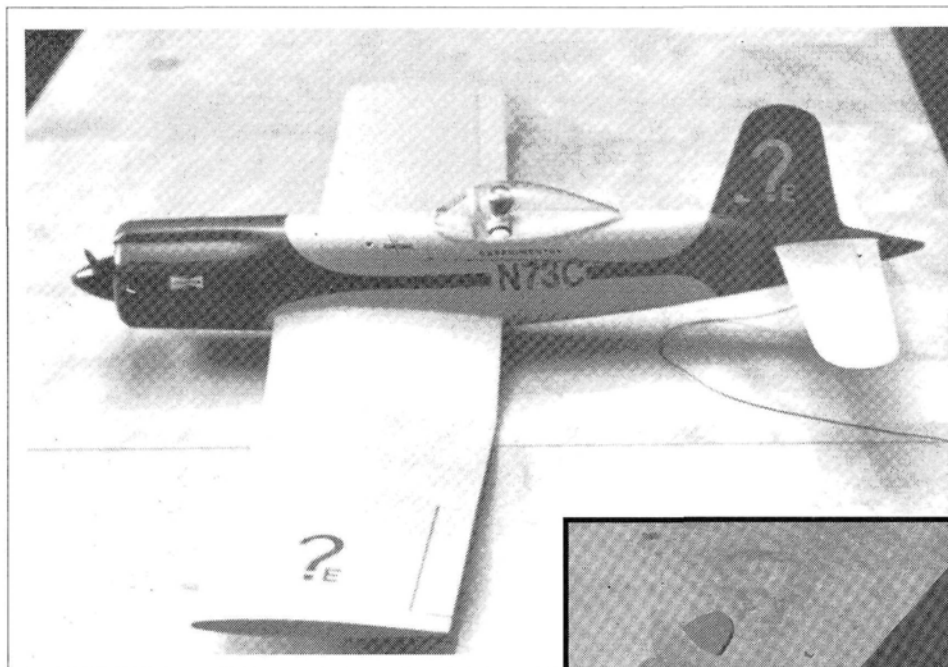
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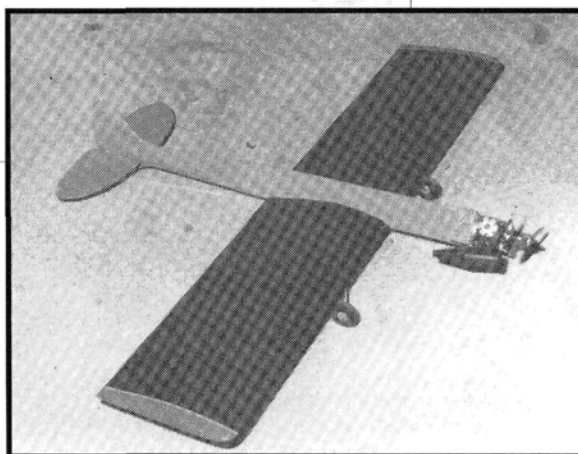
It's easy when you understand the basics; this should help!

by AL CULVER



Above; The author often uses 1/2As as proof-of-concept models. They're super fun and cost little. Generally as size goes up, so does "flyability." Cheated by using constant wing sections.

Right; A Quicky 500 that became an outlaw. Constant chord, constant thickness wing section is easiest to design.



To keep the technical stuff to a minimum, let's define some of the terms. I assume you know what leading edge (LE), trailing edge (TE), span and chord are. If not, please ask one of your flying friends.

- A **chord line** is the line drawn from the leading edge to the trailing edge, and it passes through the center of both.
- The **chord plane** is the plane formed by all the chord lines in the wing. Note that washout, or wash-in, or using more than one airfoil in a wing, cause the chord plane to bend, and it will no longer be a flat plane.

- **Airfoil thickness** is expressed as a percentage of the chord.

- **Aspect ratio** is the ratio of chord to span.

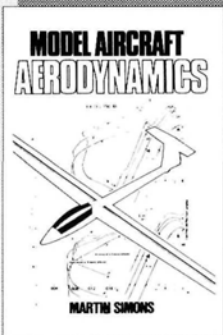
- **Mean aerodynamic chord (MAC)** is simply the wing's average chord. MAC is vitally important to the designer.

Since this article is geared toward beginning designers, I'll write in generalities. What I say won't be true for every case but it will be for most, and as you gain experience, you'll develop your own rules.

Twelve-percent airfoils (thickness-to-chord ratio) are close to optimum for our use. If you *increase* the thickness of the airfoil, the lift and drag increase. Because drag usually increases faster than lift, the airplane will have a slower top speed and a slightly slower stall speed. If you *decrease* the thickness of the section, the lift and drag will decrease. In this case, lift decreases faster than drag, so the airplane will have a narrower speed range, i.e., a slightly higher top speed and a higher stall speed. Racers

GENERATING AIRFOIL SECTIONS has always been a problem for novice model-airplane designers. Many have addressed the issue, but they make it so technical that most "non-engineers" are left in the dark.

Airfoils do amazing feats of lifting and transporting my creations around the sky. I've never flown a kit airplane that came close to providing the excitement of flying my own design, and I won't waste my time on ARFs. If that sounds like a real ego trip, all I can say is, "Try it; you might like it!" Model building can be as much fun as model flying.



LEARN MORE ABOUT AIRFOILS

WANT TO KNOW more about airfoils and aerodynamics? Read the book! "Model Aircraft Aerodynamics," one of the best sources on this subject, is a practical guide to standard aerodynamic theory as it applies to model planes. It discusses the factors that affect lift and drag; basic performance problems; trim and stability; camber and drag; and turbulent-flow and laminar-flow airfoils. Complemented by many charts, graphs and illustrations, the information is presented in an easy-to-read format. The author, Martin Simons, is a professor at the University of Adelaide in Australia, and the book is available from Motorbooks International in Osceola, WI.

are willing to trade the broad speed range for all-out top speed, whereas many sport and scale airplanes trade the broad speed range for the soft, gentle handling qualities of the 16- to 18-percent airfoils.

If you had only one airfoil to work with, the above statements would be specific; when you've determined what characteristics and speed range you're after, however, you can optimize performance by choosing the right airfoil.

Choosing an Airfoil

Symmetrical wing sections (i.e., those with the same curve above and below the chord line) on a wing with a large area-to-weight ratio will make the plane aerobatic and provide good overall flying characteristics.

Flat-bottom wings produce high-lift, stable, slow-flying airplanes and, as a result, show up on trainers and many scale models whose airfoils duplicate those used on the full-scale original. Most airfoils fall between these types, combining the best qualities of each.

The airfoils of model airplanes are *functionally* similar, but not identical, to the airfoils used in full-size airplanes, because air molecules refuse to cooperate by shrinking at the same ratio. Usually, the best and worst characteristics in any airfoil degenerate as its size is reduced until, at about 3 inches of chord, a flat plate would be just as good at producing lift.

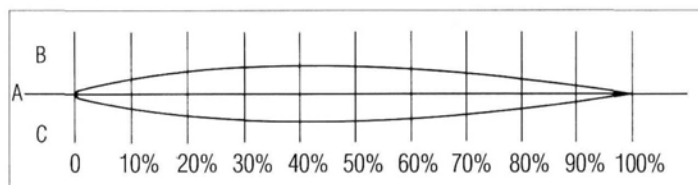
I collect old wing ribs and label them according to type of airplane they came from and whether I liked the way they flew. If I build something similar, I have a starting place for the airfoil. Most model airfoils are made with a French, or ship's, curve and use the "pleasing-to-the-eye" design criteria. Once again, this is possible because of the short chords we use.

Not all wings are constant chord and constant thickness, and many don't even use the same airfoil at the tip and root. Given these possibilities, how do you draw the individual ribs? I hear you saying, "Build a foam wing." That's a solution, but it isn't the only one. Considerations such as control-linkage routing, equipment mounting, flying- or landing-load distribution may make a built-up wing more desirable, so let's look at some ways to draw sections of different sizes.

The first is to determine the airfoil coordinates. These are the points that, if connected by a line, would describe the airfoil. If you use an airfoil shown in a book or some other reference source, this is how it's described. Until you do it yourself once or twice, it may not be easy to understand, so let's try it:

Draw the airfoil on a piece of paper (the sharper the pencil, the better). Next, draw a chord line through the airfoil section. Lines drawn perpendicular to the chord line at the leading edge and

trailing edge will give you the 0-percent and 100-percent points of the chord line. Divide the chord line into 10-percent intervals and label each line.



At this point, a good vernier caliper is the best tool for the job, but you can use a set of dividers and a good scale. Set up a table like this to record your findings:

	10%	20%	30%	40%	50%	60%	70%	80%	90%
AB	.333								
AC	-.333								

Measure A to B and divide by the chord length. I'll use a chord length of 12 inches, $AB = .333$; $.333$ divided by $12 = .02777$, which equals 2.78 percent (expressed as a percentage of the chord), so you enter:

	10%	20%	30%	40%	50%	60%	70%	80%	90%
AB	2.78								
AC	-2.78								

If the wing is symmetrical, AC will be the same, and it's entered as -2.78 percent. Find all the other percentage stations in the same way, and enter them. Measurements above the chord line are positive; those below are negative. (With a reflex trailing edge, it's possible to have a -AB, and an undercambered section could have a +AC.)

To develop a different-size rib, merely determine the new chord length and multiply them back. For example: with a 9-inch chord, $.0278 \times 9 = .250$ (or $1/4$ inch). Note that this time, your table is in inches, not percentages, because you have defined the new chord length as 9 inches.

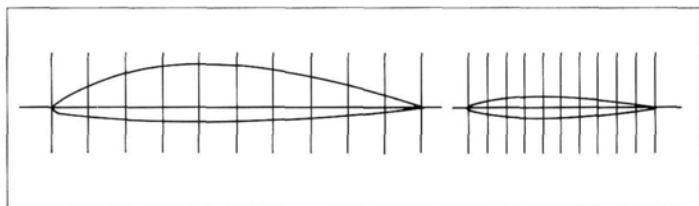
	10%	20%	30%	40%	50%	60%	70%	80%	90%
AB	.250								
AC	-.250								

PLOTTING AIRFOILS

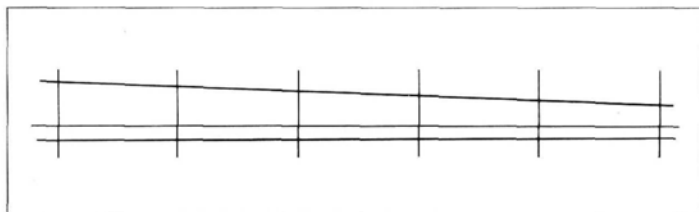
This means that, for the same airfoil, on the beginning 12-inch section, 1.2 inches from the leading edge the airfoil is .333 inches above and below the chord line. On the 9-inch chord, .9 inch from the leading edge, the thickness is .250 inch above and below the chord line. Both spots are at the 10-percent chord line. Obviously, the more divisions you make on the airfoil, the more accurate your reproduction will be.

This is the easiest way I know to get all the ribs for an elliptical wing that uses the *same* airfoil all the way to the tip. If you want to change the airfoil from the root to the tip on one of these elliptical-planform wing, you're already past the scope of this article.

How about non-elliptical wings that change airfoils from the root to the tip? As long as the leading and trailing edges are unbroken (straight root to tip), the following method works well and is accurate. Draw the two airfoils, complete with chord line and percentage stations.



Unfortunately the math gets a little tricky, so I'll do this one mechanically. Measure each airfoil as before, but make a drawing of each station that's the thickness of the rib at each end and the length of half the span.



Measure the distance at each rib location to get the individual rib coordinates for that percentage point. Ten of these drawings will give you all the rib coordinates. The more percentage points you use, the more accurate your drawing will be.

I don't want to talk about center of gravity and center of lift too much because, in the model field, small chords seem to distort some of the facts that apply to full-scale airfoils. I will say that the further forward the maximum thickness is

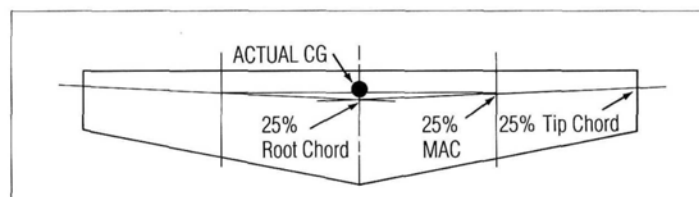
on a model airfoil, the more critical the center of gravity (CG) will be. Most of my airfoils have a maximum thickness at about 40 percent; on Quicky 500s, I've flown wings with maximum thickness points as far aft as 60 percent.

Aft CGs and critical CGs (not always the same) often manifest themselves first in poor takeoff behavior and degenerate from there; the worst case is an uncontrollable airplane that stalls and snaps into the ground on takeoff.

The only airplane that's too nose-heavy is one without enough elevator power to flare it on landing. Start with the CG well forward and work it back until the ship flies the way you want. Make the CG changes gradually; when it snaps out of a loop or a stall, you've gone too far!

Initially, I locate the CG at 25 percent of the mean aerodynamic chord. I've never gone behind 35-percent MAC on conventional planforms. The trap we fall into is accurately locating 25-percent MAC. Several of my friends have flown kit-built CAP 21s; because the plans showed the CG at 30 percent of the *root* chord (what's known as an aft CG), they were plagued with "snappers."

Look down on the wing and imagine a line drawn through the 25-percent chord ordinates. If the wing has a straight leading edge or is swept back toward the trailing edge, that line will not be straight from tip to tip. Obviously, only constant-chord, rectangular-planform wings will allow the 25-percent point to remain fixed across the span.



As I've already said, the MAC is the average of the tip and root chords. A line drawn from the 25-percent MAC on each wing will pass through the proper CG location and fall forward of the 25-percent *root* point. This is often enough to cause a critical CG, and the difference between CG points can make a dramatic difference in stability.

I hope I've kept this article understandable and have helped some of you along the way to expanding your hat size. Nothing will make you more "big-headed" than hearing someone say "Gee, that flies great! I want to build one! Where do I get it?" If you're tired of flying belly-button airplanes (everybody has one), and you're ready to try something new, *then do it yourself!* ■

FIELD & BENCH REVIEW

ASTRO FLIGHT

MINI CHALLENGER



THREE
CHANNELS
ARE MANDATORY.
IF YOU DON'T
CONTROL THE
MOTOR, IT
WILL FLY OUT
OF SIGHT!

by DAVID D. GARWOOD

BOB BOUCHER INVENTED electric flight! He's the president and chief designer of Astro Flight*, and he holds U.S. Patent 3,957,230, which was issued in May 1976 for a "Remotely Controlled Electric Airplane." Astro Flight built the first solar-powered airplane, the Sunrise, and it supplied the motor for the Solar Challenger—the first solar airplane to cross the English Channel.

Astro Flight makes high-performance motors and kits, and it set the standard with its 72-inch Challenger, which won the Open Class electric-sailplane contest at the '84 Reno Nats—its first competition!

The Mini Challenger was built according to the philosophy under-

SPECIFICATIONS

Type: Electric glider

Span: 60 inches

Weight: 31 ounces

Area: 440 square inches

Wing Loading: 10.1 ounces/
square foot

Power Req'd: Astro Flight
035 (supplied)

No. of Channels Req'd: 3
(rudder, elevator, motor
control)

Suggested Retail: \$129.95

Features: Light weight and
powerful Astro Flight
cobalt motor (included)
combine to produce im-
pressive climbing per-
formance. The complete,
high-quality kit comes
with full-size plans and
photo-illustrated instruc-
tions.

Comments: Although not
aimed at beginners, the
model isn't difficult to
build, and it goes right
where you point it. Its
compact size makes it
easier to transport than 2-
meter gliders.



During initial, unpowered, glide tests, the model showed stability and good glide performance. Up-elevator trim needed to sustain level glide was corrected later by moving the CG back.

lying the design of the Challenger: the kit provides a light, strong airframe and a powerful motor. It's aimed at experienced electric sailplane fliers, and it displays a performance that's worthy of contest fliers.

THE KIT: I immediately noticed the high quality of the balsa wood pieces, each of which is the correct size and density for its intended use. The ribs, the bulkheads, the fuselage sides and the fin are ma-

chine-cut and sanded; no die-cutting here! Spruce is supplied in two sizes: $1/8 \times 1/4$ inch for the center wing-panel spars and $1/8 \times 1/8$ inch for the wing-tip spars and the stabilizer leading edge.

Astro Flight's cobalt 035 motor is the kit's centerpiece. It's a high-quality, high-performance piece of machinery that all electric fliers should have a chance to try. The 035 motor is 1 ounce lighter than the 05, and it dramatically out-climbs the ferrite 050 can-

type motor. The well-made folding prop improves glide performance and is less likely to be damaged on landing; it's a quality touch that isn't offered by most electric-kit makers.

The kit also contains full-size printed plans and a 6-page instruction brochure that has 11 photographs. The only markings supplied are small black-on-gold Astro stickers, which were packed with the motor. The small hardware is included; in fact, to complete the kit, you'll

PIONEER OF ELECTRIC FLIGHT

THE TERM "electric flight" is synonymous with the name of Bob Boucher. A Connecticut native and a graduate of the University of Connecticut Engineering School and Yale University, after spending some time with Hughes Aircraft, Boucher founded Astro Flight in 1969.

He's now the president and chief engineer of this California-based firm that develops high-tech electric power systems. Astro Flight manufactures electric motors, charging systems and specialized power packages for aerospace, industrial and hobby applications.

Among the company's electric-powered airplane kits are the Astro Sport, the Viking Old-Timer, the Porterfield Collegiate and the Mini Challenger. Astro Flight also manufactures battery chargers, motors, gearboxes and other modeling accessories.

Boucher, who received the L.A. Highland Award for his inventions in radar, digital computers and aircraft power systems, is the author of "The Quiet Revolution." Published in 1979, the book is described as "the complete manual of electric-propulsion systems."

Bob Boucher's workshop in Marina del Rey, CA.



CHALLENGER

need only the usual adhesives and covering materials. To fly the plane, you'll have to buy a motor speed-control unit, a 3-channel radio set and microservos. To power

have any problems with this kit.

The wing construction is built-up balsa ribs, with a pair of spruce spars strengthened by 1/16-inch

find balsa stronger than the light plywood used in some glider fuselages, and this is another sign of this kit's high quality.) The bulkheads, nose block and motor

covered with transparent, red, Top Flite* MonoKote, and the fin and stabilizer with white Hobby Lobby* Oracover. I gave the rudder, the fin and the propeller spinner two coats of sand-colored polyurethane paint, and I applied two coats of primer and two coats of polyurethane paint to the fuselage. I find the transparent MonoKote a little difficult to use, because it doesn't stretch, shrink, or lift and re-stick as well as the opaque MonoKote does. It is lighter, however, and it really looks great on the airplane! If you paint the fuselage, you'll only need one roll, but if you cover the fuselage with film, you'll need two.

The Oracover is great. To decorate the wing, I used a razor knife to cut letters from white Oracover, using the lettering on the kit box as a pattern. It was easy to apply the letters to the wing, because Oracover goes on at a low temperature and traps few bubbles.

RADIO INSTALLATION: Three channels are required—for rudder, elevator and motor speed control. This *isn't* an airplane to fly on only two channels, because without motor control,

Major components laid over the plans. The outer wing panels are constructed as a single unit and cut apart for installation on the center panel.

the motor, a special (narrower) 5- or 6-cell 900mAh battery pack is required. (Standard 1200mAh cells won't fit inside the fuselage.)

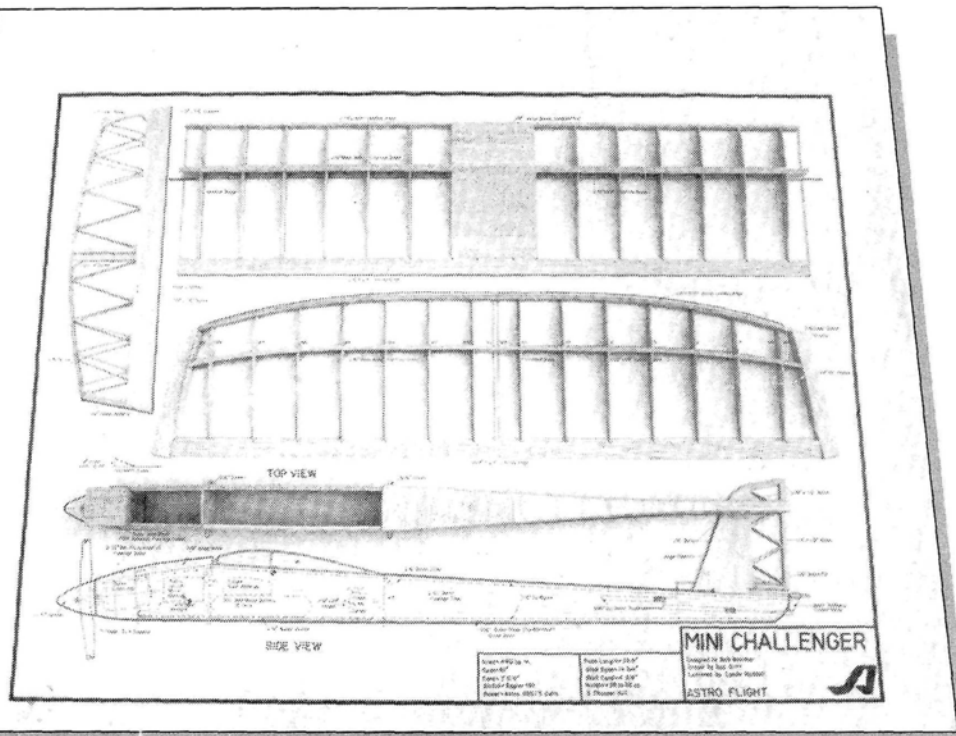
CONSTRUCTION: Building is straightforward and satisfying. The plane's conventional design and the kit's high-grade materials are a pleasure to work with. The Mini Challenger is *not* for beginners. If you've never built a hatch, installed balsa pushrods, wired a motor-control unit, or calibrated elevator- and rudder-control throws, you should learn with a different kit, as there are no instructions given for any of these operations. If you've done these things before, however, you won't

balsa shear webs. The fin and the elevator are 1/8-inch balsa-sheet stock, pre-cut to shape. The rudder and horizontal stabilizer are built up from balsa and spruce stock. Threaded rod, hinges, control horns and high-quality nylon clevises are included in the kit.

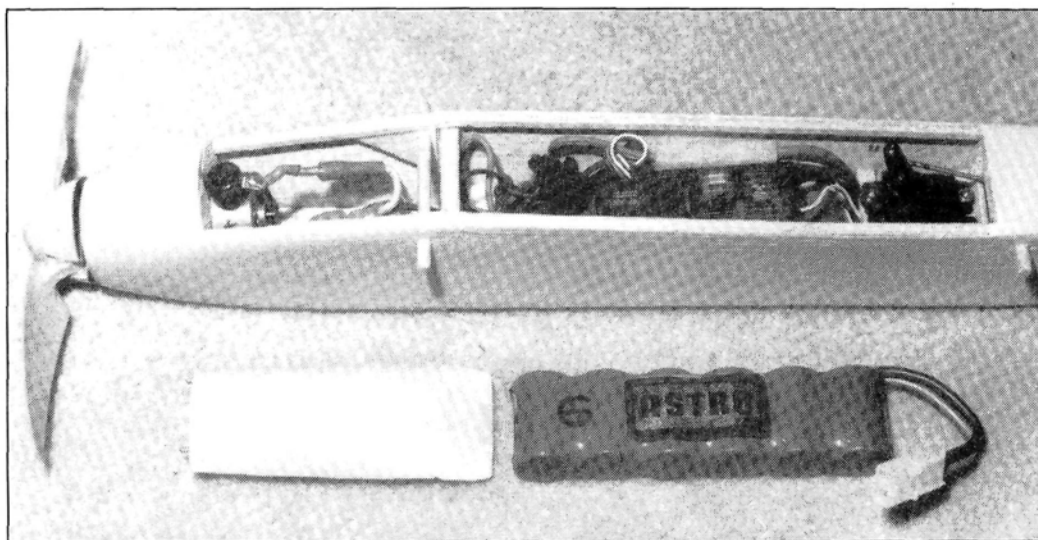
The pushrods are made of threaded rod and balsa sticks. The fuselage is light, strong and easy to build. Full-length side panels are pre-cut from 1/8-inch medium-density balsa. (I

hatch are also of balsa.

COVERING AND FINISHING: The model shown on the box looked attractive, so I set out to duplicate the factory color scheme. The wings and elevator were



The kit includes full-size plans, sanded ribs, all the required wood, an Astro Flight cobalt 035 motor with folding propeller, and a complete hardware package.



Astro 035 motor, Futaba MCR-4A speed control receiver and 6-cell 900mAh battery pack fit inside the fuselage. Microservos are required. The hatch and a spare Astro 900mAh 6-cell battery pack are in front.

initial testing, I set up the airplane as a glider. The motor was in place as nose weight, but I left out the motor battery pack. In this configuration, the model weighed 25 ounces for a wing loading of 8.2 ounces per square foot.

I tossed the Mini Challenger into the air and it flew beautifully. It needed eight clicks of up-elevator trim to flatten out the glide. Tossing it up to 15 feet gave a nearly hands-off glide of more than 100 feet.

Its first powered flight was hectic! With the 6-cell motor battery installed, its weight was 31 ounces for a wing loading of 10.1 ounces

it will fly out of sight before the batteries run down! I installed a Futaba* Attack 4N8L 4-channel radio set. The MCR-4A receiver incorporates a motor speed control and a battery eliminator circuit. With microservos, this radio is a really hot setup for electric-powered airplanes. The slender fuselage requires the use of microservos. Servo and receiver locations are shown on the plans.

On the fuselage, I particularly like the solid nose block, which has been drilled to serve as the motor mount. It increases the strength of the front of the fuselage, and it holds the motor firmly, but allows it to slide back on impact. If you've ever built an electric airplane with a weak motor mount covered by plastic cowling, you'll appreciate this design! It's rugged, and it looks good.

The kit is a high-quality product, and I had no problems with the building. Using CA throughout, construction took me 29 hours, not including wing lettering. I made some changes from the plans and instructions:

- I notched the trailing-edge piece to accept the ribs, be-

cause I've had ribs break loose there on other models.

- I inserted a hardwood strip to protect the wing trailing edge from being damaged by rubber bands.

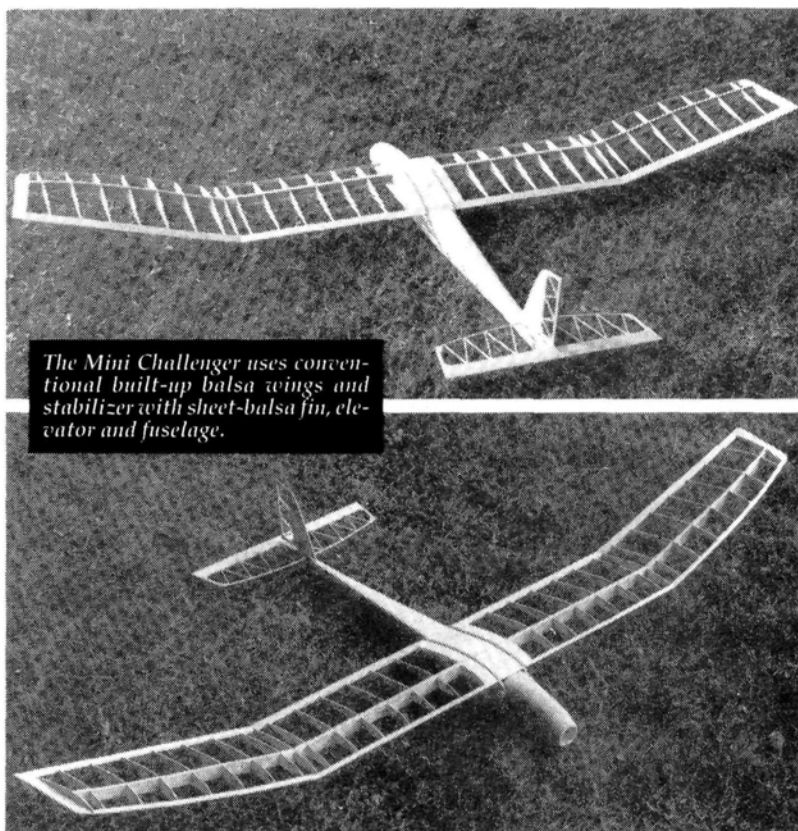
- I widened the fuselage at the tail by $\frac{1}{4}$ inch to allow more room for the elevator pushrod and to increase cooling airflow.

- I moved the CG back $\frac{1}{4}$ inch and added wash-out. (See the section on performance.)

Looking back now, I should also have made more substantial provision for cooling the motor and motor battery pack, as both are hot after flights.

This model cost approximately \$156: \$129 for the kit, including the motor and folding prop; \$5 for adhesives; \$11 for a roll of covering material; \$8 for spray paint and primer; \$1 for a $\frac{7}{64}$ hex wrench to mount

the prop; \$2 for radio-receiver foam; and \$1 for wing-mounting rubber bands. You also need a mo-



The Mini Challenger uses conventional built-up balsa wings and stabilizer with sheet-balsa fin, elevator and fuselage.

tor speed controller, a 3-channel radio set with two microservos, one or more 900mAh battery packs, and a battery charger for the motor-battery packs.

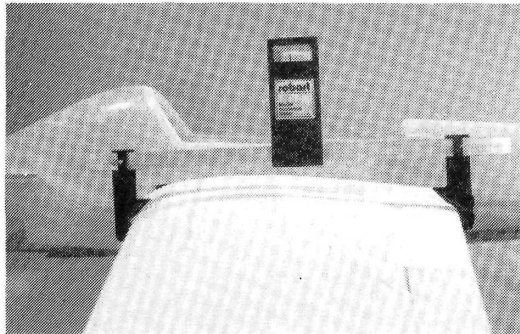
PERFORMANCE: For

per square foot. When under power, the Mini Challenger is quite sensitive to control input, and, at first, I thought this was roll-axis instability. It also had a tendency to

(Continued on page 94)

Airframe Alignment

by MIKE LEE



The Robart incidence meter is used to measure the wing incidence on this Beetle. Ensuring proper wing alignment is a must for achieving a straight-flying aircraft.

No question! Straight birds fly better; here's how.

IN A PATTERN BIRD, small amounts of twisting or warping will cause the plane to change its flight characteristics as it changes its speed. This is true of any model, but the effect is more pronounced in faster-flying, pattern models. Precise alignment is the ultimate cure for this problem.

The most important tool for building a "true" wing is the building surface, which must be flat, uncluttered and big enough to hold the entire wing. I bought a length of Formica counter top (which is very flat and "bulletproof") at a local hardware store for about \$2 a foot. Many builders use a wooden door core. Whatever you use, make sure it's twist-free and level.

For the actual construction of the wing, it's wise to invest in some building tools. Many modelers use a wing jig to align the ribs and hold them while building, but this isn't absolutely necessary. The tools I value most during build-up are a straightedge and building triangles. These enable me to keep the edges straight and the ribs perpendicular when they should be. On foam wings, I use the ruler to measure the chord angle of the tips of the cores compared with that at their roots; this comparison tells me if the core is warped. When the build-up is completed, I move on to bigger and better things.

One of my most useful tools is the incidence meter. Robart* has been manufacturing one for years, and mine is 10 years old. This tool is first put to work on the wing. I block up the wing on sandbags and then weight it down with more bags until I know it won't move easily. With the incidence meter, I measure the wing root to the tip once more. When I'm satisfied with both wing halves, I mount the wings to the fuselage.

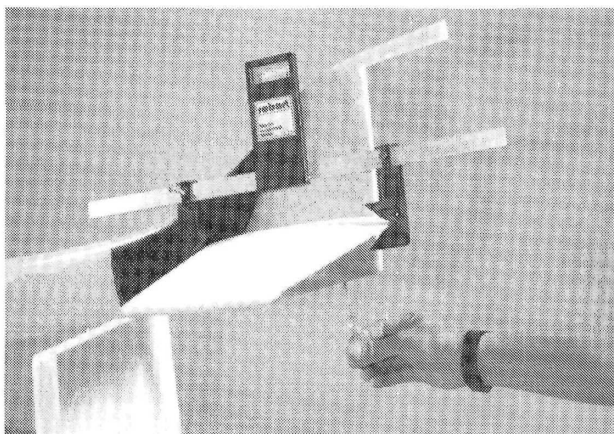
My Pattern Tek Beetle has a plug-in wing,



That small, dark block inside the fuselage is the wing-incidence adjuster in the Beetle. Absolute alignment can be achieved using these devices, and they can also help to correct the airframe for incidence of the wing to the engine or to the stab.



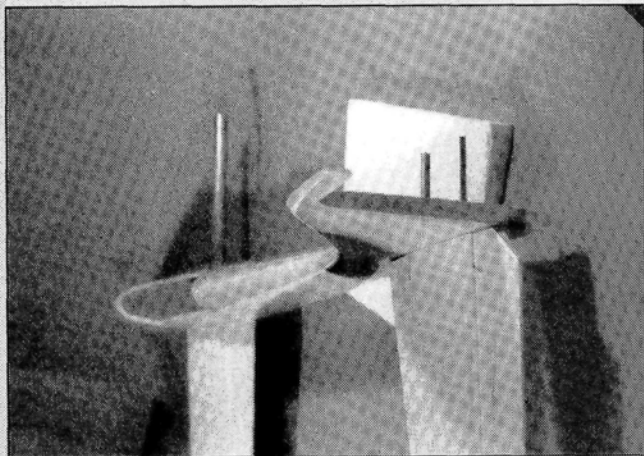
The incidence meter at work again, this time on the horizontal stab. Before permanently gluing a stab into place, make sure that it's set correctly relative to the wing. This is one way to do it.



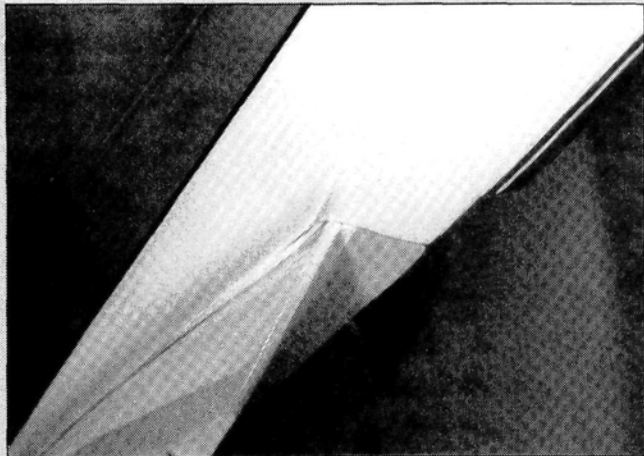
The Beetle features an adjustable stab, an alternate method of ensuring proper stab-to-wing alignment. You might only use it once, but that one time pays off in big dividends!

PHOTOS BY MIKE LEE

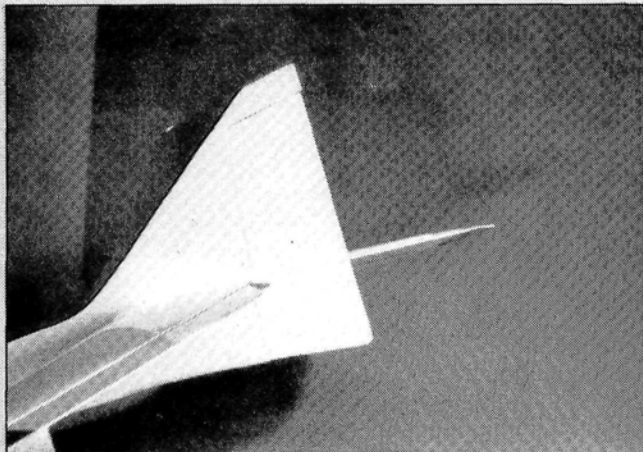
Airframe Alignment



Sighting down the fuselage from the tail is the way to check for twists in the fuse. You can also check for the horizontal alignment of the stab and wing from this point of view. The alignment must be correct for the plane to fly correctly.



This view of the wing-to-fuselage joint shows how the wing saddle had to be shimmed to correct the incidence of the wing to the stab. Such measures make for an unsightly joint, at best.



This is the most difficult type of horizontal stab to align: the anedral stab. In this case, the tail belongs to the prototype Excelsior. Misalignment here will cause a multitude of problems in flight.

and both halves share a common tube spar. For alignment to the fuselage, pins are used at the leading edge of the wing-root saddle. One of the photos shows that these pins are adjustable, so they provide the ability to correct wing halves that may be misaligned. Used on both wings, the adjusters can be used to change the entire wing incidence in relation to the fuselage, stab, or engine thrust line. This feature allows the precise alignment we're seeking, and even though it's no longer variable once the proper setting has been achieved, it's worth its weight in gold the first time you use it.

To arrive at the correct wing-to-stab incidence, builders usually mount the wing first and then align the stab. This is particularly true in a fiberglass bird, because the wing saddle is already molded in, and changing it leaves an unsightly mess. If you don't believe me, look at the photo of the prototype Excelsior, which required a wing-incidence correction of 3 degrees relative to the stab. Yes, I mounted the stab first, and the wing second. Don't make the same mistake! Sandbag the fuselage with the wing mounted to it, measure the wing incidence, and mount the stab to the tail in accordance with the plans, making sure the incidence is correct.

The Beetle has another lovely alignment feature that helps to deal with this problem: Its adjustable stab allows changes in the stab incidence. A small screwdriver slot on the underside of the plane permits the stab to be adjusted easily when required. This feature also allows the stab to be removed. As you can see, this is a rather versatile aircraft! If your bird doesn't have this feature, ensure that the alignment is correct the first time, or be prepared for less-than-optimum performance.

Now for the fuselage. Of course, a wooden fuselage allows no room for error. After it has been built, it's extremely difficult—if not impossible—to correct twists or bends. There are several fuselage-building jigs on the market, and these are an immense help in building the fuselage straight.

On a fiberglass fuse, it's easier to correct a slight problem. While using a heat gun, I twist or bend the fuselage in the opposite direction, but the results aren't wholly satisfactory. The fuselage will usually have a dent where the fiberglass has been compressed by the opposing twist. The fuselage is straight, but not cosmetically pleasing.

For engine alignment, I usually use the plans as my starting point for any variations from zero in thrust settings. On a fiberglass bird, most manufacturers "mold-in" the correct thrust settings by getting you to align the engine-spinner backplate with the fuselage spinner ring. This works most of the time, but I always allow extra distance between the spinner plate and the spinner ring, just in case an adjustment is required.

When the overall airframe is completed and aligned to your satisfaction, the only items still to be inspected are the flying surfaces. Elevators, ailerons and rudders are easy to warp, particularly when an iron-on covering is used. Just be careful to maintain the straight-and-flat look.

At any rate, whichever model you're building, take time to ensure the bird is straight. It's essential for consistent performance.

**Here's the address of the company mentioned in this article:
Robart Manufacturing, P.O. Box 1247, St. Charles, IL 60174.*

FLYING ACES STICK

(Continued from page 32)

covered, hinge the control surfaces. Thread hinges work well; cotton thread is

colorful, cheap, and won't bind. Using a medium needle, sew a figure-eight stitch at the locations shown on the plan.

The control horns are cut from small pieces of 1/32-inch plywood. Cut a slot with a sharp knife and CA them into place. Remove any covering from contact areas, and slow-CA or epoxy the vertical fin to the stabilizer. Use a square to true them. Install the completed tail assembly onto the fuselage. I used 1/32-inch music wire for pushrods, routed along the inside of the fuselage. A "U"-shaped keeper, bent from a straight pin, prevents the pushrod from flexing between the cross-pieces.

Next, make up a set of wheels. To save weight, I used 6mm lite-ply to make 3 1/2-inch diameter wheels. Insert 1/4-inch dowels, 3/4 inch long, for the hubs. Remember to use a piece of brass tubing in each hub as a bearing. Solder the wheels into place with a washer on the landing gear.

Mount the motor and the gearbox. With the wing held on with rubber bands, move the 800mAh flight batteries and radio around until the model balances at 3 3/4

inches aft of the leading edge. Use 1/16-inch servo tape to mount the radio components, and use Velcro to hold the motor batteries in place. Keep everything as low as possible. Microservos and receive-

the connectors and switches from floating around. In fact, fasten down anything you can below the Stick's sides. Control throws should be 3/4 inch each way for rudder; and elevator 3/8 inch up and down.

Install your choice of motor control right behind the motor. Now you just have to charge the batteries, take some photos, and go flying!

PERFORMANCE: Select a calm morning or evening for the Stick's first test flight. Remember that there's no "normal" fuselage with which to orient once the model gets some altitude. With the wing strapped into place and everything working, power the motor and jog into the breeze. Launch the Stick at a level attitude; don't point the nose up too much. Don't throw it; just let it fly out of your hand.

As the Stick accelerates, watch its rate of climb. You may have to add downthrust to keep the model from climbing too steeply. Remember, the Flying Aces Stick won't do aerobatics; it's just an old-time electric floater. You should also remember to store the Stick standing on its nose so that the fuselage will be less likely to warp.

Once you get used to the way it flies, I'm sure you'll enjoy it. The Stick is easy to make and it flies well. What more could you ask of an entry-level electric trainer? ■

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ers are about 1/2 inch high and help reduce drag. To further reduce drag, a 7-cell motor battery can be "flattened" into 7 cells side by side. Use servo tape to keep

flies, I'm sure you'll enjoy it. The Stick is easy to make and it flies well. What more could you ask of an entry-level electric trainer?

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SOARING FUN FLY

(Continued from page 21)

Salto, an ASWQ-20, an LS-2, a Reiher, a Jantar-1, Minimoas, a Super Albatross, a TG-2, a DG-100, a SG-38, a TG-8, a DG-101, Grunau Baby's, Schweizer 1-26s, an ASW-17, an ASW-15, a Pheobus, a Diamont and a DG-300. There were a lot of models, so I apologize if I've left any out.

J.R. Radio's Tom Kikuchi attended the event, and he donated three top-of-the-line PCM radios. He's already made a commitment to attend and support next year's Fun Fly. Bob Boomer, of Beemer Models contributed six model kits. Other supporters included Sig, Vinylwrite, R.C. Soaring Digest, Combat Models, Roke, Hobby Lobby, Airtronics, Futaba, Scale Model Research, Hobby Lobby, Kookubura Publishing, Ace R/C, Tower Hobbies, Santa Monica Sailplanes, Top Flight Models, Bill Liscomb, Pete Bechtel and Windspeil Models, and Viking Models. These great companies are helping to shape the future of scale soaring, and they think that it has a bright future.

The following people have given us outstanding press support since the Scale Fun Fly's inception: Byron Blakeslee of M.A.; Charlie Morey, owner and editor of Slope Soaring News; and Jim Gray of R.C. Soaring Digest. Other support came from this magazine, M.B., RCM, and Flying Models. Our club says thanks to you all.

The Tri-City Soarers certainly feel that the Fun Fly was worth the effort. We're a small club, but we have some great members who donated a lot of their time. These people deserve to be mentioned by name: Roy Lightle, Harry Smith, Mike Prechtel, Pete Vails, Ron Hollandbeck, Gene Cope and Roy Bunnell.

Perhaps you'll attend the Tri-City Soarers '90 R.C. Scale Soaring Fun Fly this year; it will be held on May 25 - 27. I hope that this article will encourage you to explore a new area of R/C. Until May '90, think slope soaring!

SMALL STEPS

(Continued from page 26)

things for small airplane lovers. Even though its smallest system isn't the lightest one around, it's one of the best and is actually Ace's standard system. The Model 91 narrow-band, dual-conversion receiver is capable of 7-channel operation. It measures 1.875x1.25x1.56 inches, and it weighs 1.7 ounces. The Bantam Midget

(Continued on page 65)

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READERS' REPORTS!

We'd like you to participate in our "Readers' Reports" program, which was established to give you an opportunity to voice your opinion on products you've used. The guidelines are easy: Just send us a brief 3 or 4 paragraphs and a picture or two of any kit you've built or have underway. Tell us what you thought. If we use your report with one of our regular "Field and Bench" reviews of the same product, we'll award you a complimentary subscription to MAN. It's that easy. Participate! Make your views known.

Some of the kits now being reviewed:

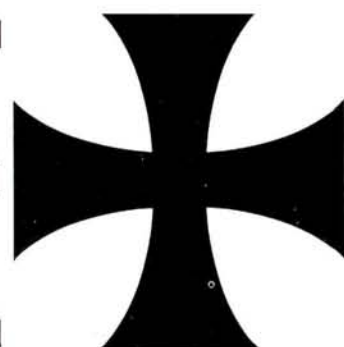
Ace All Star Bipe
Parkinson Regal Eagle
Global EZ Dago Red
Yellow Aircraft CAP-10
GMP Rebel
Miniature X-Cell 30
Parma Aerosprint
Hobby Lobby/Graupner Race Rat
Midwest Hots II
Sig Four-Star 40
O.S. Ryan
Global EZ F-16
Kyosho Electric Mustang
Dynaflite 40 Mustang
Banded Roun-Tuit
EZ P-51 Dallas Doll
CGM Freedom 20
R/C Design Weasel
Midwest Electric Hots
Top Flite Phasor

FIELD & BENCH REVIEW

T O P F L I T E

ELDER

BIPE



Newest in the series adds a wing, doubles the area and squares the fun!

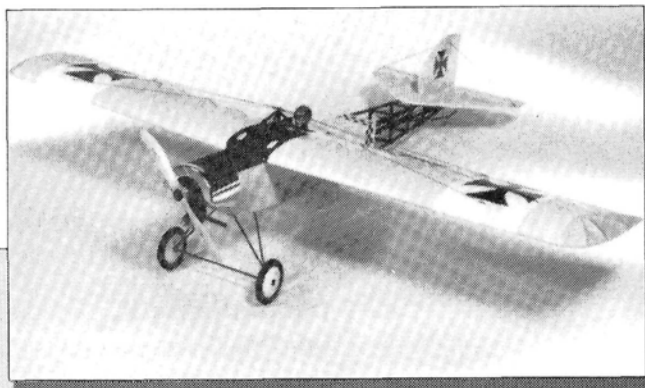
by DICK PURDY



PHOTOS BY RICH UNAVITCH

SPECIFICATIONS

Type: Sport
Span: 60 inches
Weight: 8³/₄ pounds
Area: 1492 square inches
Wing Loading: 13.5 ounces/square foot
Power Req'd: .45-.75 2-stroke; .60-.90 4-stroke
No. of Channels Req'd: 4 (minimum)
Suggested Retail: \$173.95
Features: Old-timer look that's easy to customize with details of WW I era; slow, stately flier; light wing loading; rugged construction; excellent shock-absorbent landing gear.
Comments: The plane looks majestic in flight; field-mounting of upper wing isn't "quick and easy"; despite high parts count, building isn't difficult, just time-consuming.



The Elder Bipe's Elder Brother

THE NEW BIPLANE from Top Flite is the third member of the Elder family, the first two being monoplanes. The entry-level Elder monoplane was a .20-size craft with a WW I look, and it was followed by another WW I monoplane, this one designed for a .40-size 4-stroke engine.

The Elder 40 isn't a scale model of any full-size aircraft. Nevertheless, the plane's appearance is right out of the early years of powered flight. It combines vintage WW I looks with 4-stroke power. The Elder 40 model, like the new Elder Bipe, features quality parts and easy-to-follow instructions. Describing the Elder 40 in the March 1986 issue of *MAN*, Tom Burdin wrote, "The real joy of the Elder is in creating your own dreams in the finishing, and in reveling in showing off your creativity with an aircraft that you are not afraid to take to the field. This one is a real dreamboat to go out and have fun in the sun with." He also told readers that the plane "will be a joy for any modeler who likes a marvelous-looking aircraft." A wide choice of color schemes, decorations, flying wires, guns, insignia, pilot and windshields will fit on the Elder 40's versatile design.

TOP FLITE MODELS* new Elder Biplane is the largest in a series of three, all of which are designed by well-known scale modeler Hal Parenti. These Elder planes share a "look" of WW I aviation and are pleasing to the eye.

THE KIT: Having built the two earlier monoplane versions, I had a feeling of déjà vu when I tackled the new biplane. Much of its design is the same, but on a larger scale. The kit box was expertly packed, and there were no damaged or missing parts. The balsa's quality and the die-cutting were excellent; plywood and spruce were also "top-flight." The hardware package even included a molded fiberglass-filled engine mount.

The plans came in six sheets, which had to be taped together to form three king-size sheets, and these were supplemented by a 19-page illustrated booklet

of building instructions. Accurately bent wire landing-gear parts and cabane struts, which require soldering into assembled units, were provided.

The list of "parts not included" is fairly standard for built-up kits these days. The builder must provide an engine, radio, adhesives, covering, a fuel tank and tubing, wheels and collars, paint, decals and pilot figures, which, for purely esthetic reasons, shouldn't be omitted.

CONSTRUCTION: The instruction booklet is complete, accurate and organized in a logical sequence, but I found this Top Flite manual more difficult to follow than some others I've used. Instead of dividing the instructions into small steps so that you can stop after completing each one and check it off, the Elder manual presents lengthy paragraphs that encompass many steps. The result is a complex text in which it's easy

to lose your place. This small problem doesn't interfere with building a good model, however.

Building starts with the upper wing, which has at least 150 parts! The lower wing is built much like the upper, although it requires that ailerons and servo provision be added. Tail feathers come next. These are of standard built-up balsa construction for the fin and stab and tapered balsa stock for elevators and rudder. When constructing these tail control surfaces, the builder can incorporate such optional detailing as scalloped trailing edges (à la Fokker D-7) and rounded-off or pointed corners at the outboard ends.

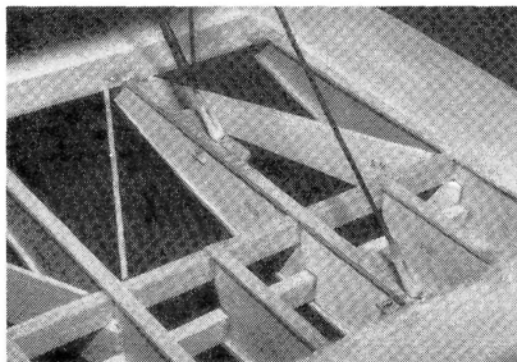
The fuselage is the last major construction element. It's framed up as a straightforward box of spruce longerons, heavy balsa-sheet wing saddles, and plywood landing-gear and cabane-trunnion blocks. Half of the top of this box

ELDER BIPE

is covered with formers and balsa sheeting, which rounds it nicely. Balsa sheeting forms the cowling forward of the fire wall, which houses the engine. It's recommended that the engine be mounted inverted, so the bottom of the cowling is left off to expose the cylinder head.

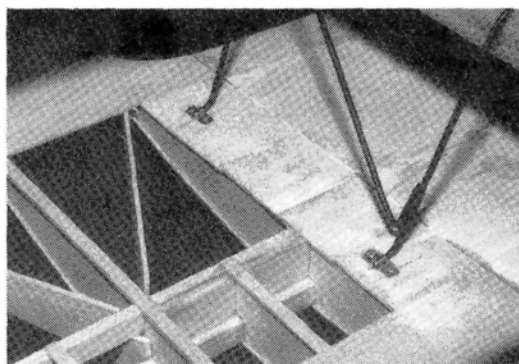
Mounting the engine proved to be more of a chore than I had expected. I opted for a K&B* Sportster .65 and a Slimline* Pitts-style muffler made especially for that engine. This combination can be mostly concealed and still provide hefty power. The best mounting angle turned out to be 45 degrees clockwise from the inverted position. This minimized the alterations needed for cylinder-head and muffler-exhaust-pipe clearances in the cowling. Next came the problem of mounting the engine far enough forward for the thrust washer to clear the nose ring. It took a 3/4-inch plywood extension block between the engine mount and the fire wall to do it.

Space for the 12-ounce Du-Bro* fuel tank was pretty tight, so I taped a heavy cord lengthwise around the tank, and this gave me a "handle" for retrieving it later. Inserting the tubing from tank to fire wall to engine was the usual picky job, but all fit well when complete.



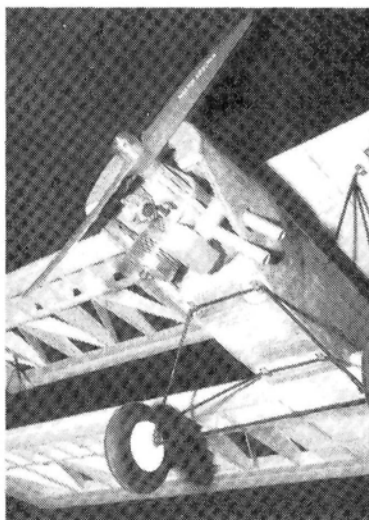
Interplane struts are music wire with clevises that attach to fittings bonded to ribs. Note the number of wing parts in this picture alone!

To enhance the "antique" character of the Elder, the aft half of the fuselage was left uncovered to show the box of longerons and cross-members. Heavy black thread or fishing line is run diagonally across and between every panel point of this open framework. This detail

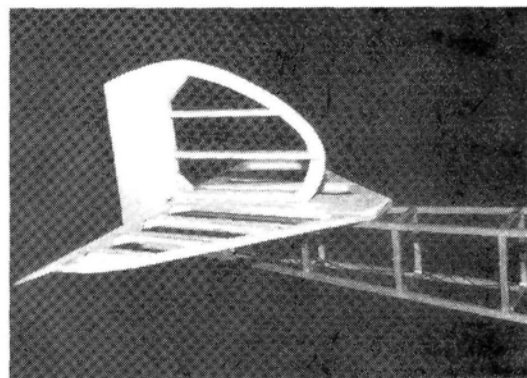


Upper wing attachment employs clips that capture cabane strut wire.

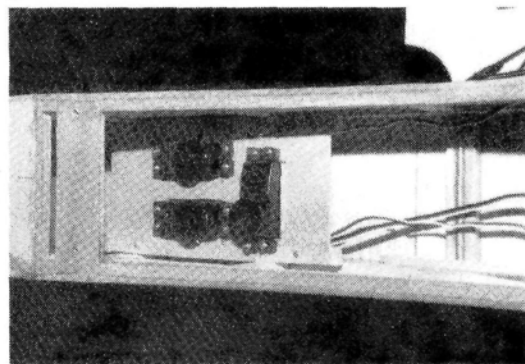
is easy to do and definitely worth the effort. Cockpit details are up to the builder; I opted for only one cockpit, one pilot, one windshield and two machine guns. These are German Spandau guns sold in kit form by Williams Bros.*, who also



K&B 65 Sportster was inverted and canted to permit scale-looking exhaust exit points. No cooling problem here!!



Nothing complicated in the tail feathers—just some good ol' balsa-building techniques.



Plenty of room for the radio. Although plans specify location as well aft in compartment, experience has shown that farther forward is a better position—makes balancing easier.

make the pilot figure.

For the final set-up of this model, you need interplane ("N") struts between the wings. The plans show 1/16-inch wire with nylon clevises at one end of each vertical member and Z-bends at the other. After the initial flight, these wire assemblies were swapped for a more rugged, hardwood airfoil-shaped strut.

The landing gear is installed, and metal straps retain it in grooved plywood blocks in the fuselage. There's an unsupported 2 1/2-inch axle shaft for each wheel, and these allow sufficient deflection for simple, effective shock absorption on landings. A music-wire tail skid is standard for the Elder, but an alternative steerable tail skid is also provided. This steerable skid was too "Mickey Mouse" for me, so I stayed with the fixed design, which offers no problem off grass once you get used to it.

COVERING: To complete this model, you should select the color

(Continued on page 66)

SMALL STEPS

(Continued from page 60)

servo measures .70x1.125x1.43 inches and weighs .85 ounce. A 3-channel system weighs 4.3 ounces; with Ace's 270mAh battery pack, it would still weigh only slightly over 6.5 ounces. The power of the Bantam servo is enough for most .60-powered planes.

The nice part about the Ace system is that it's also available in kit form for those of us with limited funds and a lot of time on our hands! The Bantam servos aren't difficult to assemble, but they do require nimble fingers when dealing with the small parts.

Ace battery packs cover the whole range, from 110, 270, and 500mAh at 1.25, 2.25 and 2.8 ounces, respectively. If you want to fly forever, there's even a 1200mAh pack!

Thanks to Ace, Cannon and Futaba for responding to my questions and for their interest in those of us who think big and fly small.

I'm going to start saving my money to buy some of those Futaba S33s. My KPS18s are beginning to show a little age!

*Here are the addresses of the companies mentioned in this article:

Cannon R/C Systems, 2828 Cochran St., Suite 281, Simi Valley, CA 93065.

Futaba Corp. of America, 4 Studebaker, Irvine, CA 92718.

Ace R/C, Inc., 116 W. 19th St., Higginsville, MO 64037.

QUIET FLIGHT

(Continued from page 43)

workbench). The balancer can even be used for spinners, which are usually overlooked.

Since I bought my unit, I've re-balanced props that I previously thought were OK. I'm surprised at how much more quietly they run when finely balanced. A balanced prop will also give your model better performance. Best of all, the unit isn't expensive: it retails for \$24.95, but I've seen it on sale for as little as \$16.99!

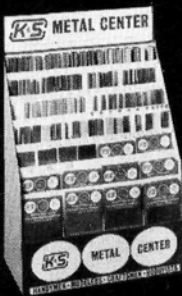
New Electric Glider

I was lucky enough to fly a new prototype electric from Sports Aviation* of Japan, which recently showed its new EZ Lota 1700E to the people at Global Hobbies (its U.S. distributor).

The fuselage is made of a new plastic material known as Tufflex. I understand this is the material that Honda uses in the fenders of its CRX autos. It seems to be

(Continued on page 70)

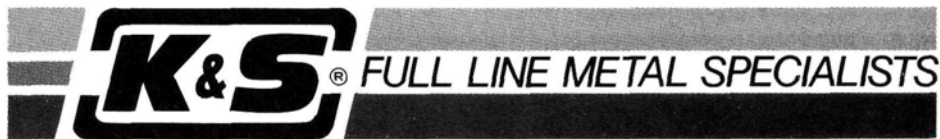
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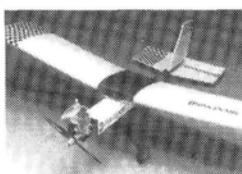
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100	1/16	.25	262	3/32 x 3/16	1.10	250	.005 Brass	.70
101	3/32	.30	264	1/8 x 1/4	1.20	251	.010 Brass	1.10
102	1/8	.30	266	5/32 x 5/16	1.30	252	.015 Brass	1.50
103	5/32	.35	268	3/16 x 3/8	1.40	253	.032 Brass	2.70
104	3/16	.40				254	.008 Tin	.50
105	7/32	.45				255	.016 Alum.	.50
106	1/4	.50				256	.032 Alum.	.80
107	9/32	.55				257	.064 Alum.	1.35
ROUND BRASS TUBE (12")						258	Asst Brass	1.30
125	1/16	.30				259	.025 Copper	2.60
126	3/32	.30						
127	1/8	.30						
128	5/32	.35						
129	3/16	.45						
130	7/32	.50						
131	1/4	.55						
132	9/32	.60						
133	5/16	.65						
134	11/32	.70						
135	3/8	.75						
136	13/32	.85						
137	7/16	.90						
138	15/32	.95						
139	1/2	1.00						
140	17/32	1.05						
141	9/16	1.10						
142	19/32	1.20						
143	5/8	1.25						
144	21/32	1.40						
COPPER TUBE (12")								
117	1/16	.25						
118	3/32	.30						
119	5/32	.40						
120	1/8	.30						
SOFT BRASS FUEL TUBING (12")								
121	1/8	.40						
BRASS STRIPS (12")								
230	.016 x 1/4	.20						
231	.016 x 1/2	.30						
232	.016 x 1	.50						
233	.016 x 3/4	.40						
234	.016 x 2	.90						
235	.025 x 1/4	.25						
236	.025 x 1/2	.40						
237	.025 x 1	.70						
238	.025 x 3/4	.55						
239	.025 x 2	1.30						
240	.032 x 1/4	.30						
241	.032 x 1/2	.50						
242	.032 x 1	.85						
243	.032 x 3/4	.65						
244	.032 x 2	1.60						
245	.064 x 1/4	.60						
246	.064 x 1/2	1.00						
247	.064 x 3/4	1.25						
248	.064 x 1	1.70						
249	.064 x 2	3.00						
SQUARE BRASS TUBE (12")								
149	1/6 Square	.50						
150	3/32 Square	.55						
151	1/8 Square	.60						
152	5/32 Square	.70						
153	3/16 Square	.80						
154	7/32 Square	.90						
155	1/4 Square	1.00						
BRASS STREAMLINE TUBE (12")								
122	Small	.75						
BRASS ANGLE (12")								
171	1/8 x 1/8	.45						
172	5/32 x 5/32	.50						
173	3/16 x 3/16	.55						
174	7/32 x 7/32	.60						
175	1/4 x 1/4	.65						
BRASS CHANNEL (12")								
181	1/8	.55						
182	5/32	.60						
183	3/16	.65						
184	7/32	.70						
185	1/4	.75						
SOLID BRASS ROD (12")								
159	.020	.08						
160	1/32	.08						
161	3/64	.12						
162	1/16	.20						
163	3/32	.25						
164	1/8	.40						
165	5/32	.50						
166	3/16	.80						
167	.114	.40						
168	.081	.40						
169	.072	.25						

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DuraBat
.40-size, 4-channel
aerobatic trainer.

ELDER BIPE

scheme of an airplane from a bygone era. I chose a red MonoKote* covering just like the one on the kit's box, and I decorated it with German WW I decals from Major Decals*. To simulate the removable metal cowl panels of that period, I used chrome MonoKote. The exposed wooden frame members at the aft end of the fuselage were treated with Loctite's* finishing resin. This fuelproofs and slightly darkens the wood to resemble stain and varnish.

PERFORMANCE: Before setting off for the first flight, I checked the balance of the craft. The balance point was marked with short strips of tape on the underside of the top wing, providing a place to put your fingertips when doing your balancing act. Because the plane seemed about level, I added a Harry Higley* Heavy Hub to the prop shaft. This didn't seem to change the balance much, but I wasn't worried—the balance appeared to be right. *Wrong!*

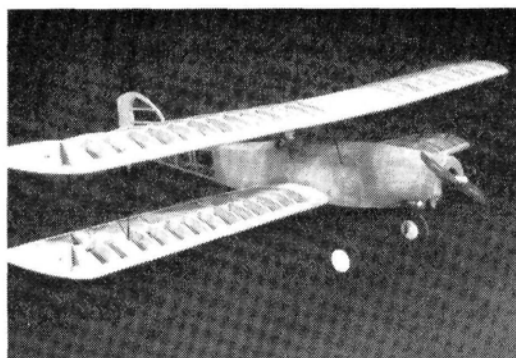
After a few false starts on takeoff, the plane became airborne, but it headed off in whatever direction it chose. The non-steerable tail skid takes some getting used to! Once in the air, the plane became difficult to control. I was able to complete two flights, each with a somewhat erratic flight path but an acceptable landing.

One of my flying friends asked if he could try to fly it. I'm sure he felt he was more skilled than I, and wanted to prove it. After he got the plane airborne, it headed straight into the top of a tall tree, then fell about 50 feet, and landed upside-down on its top wing and back. The crash proved just how rugged its design is. It also proved the absolute need for a balance that's not just level, but really nose-down. As part of the refurbishing process, I put 5 ounces of lead into the nose, and this

is supplemented by the 2-ounce "heavy hub" on the prop shaft. The repairs weren't horrendously difficult, and now the balance is more positively nose-down. Moving the balance point forward 1/2 to 3/4 inch should provide much more pitch stability.

The plane now flies with a stately elegance that's exhilarating. If you'd enjoy a chance to try a truly different sport model—one that's a real eye-catcher at the flying field—give the Elder Bipe serious consideration. You can benefit from my experience! Just remember these things:

- Make sure that the plane balances somewhat nose-heavy.
- Use an engine at the middle to high end of the recommended range.
- Don't set throws of the control surfaces at less than the suggested



By any modeler's standards, this is a builder's kit. Although the parts count is high, so is the quality, making this a "fun" project.

amounts.

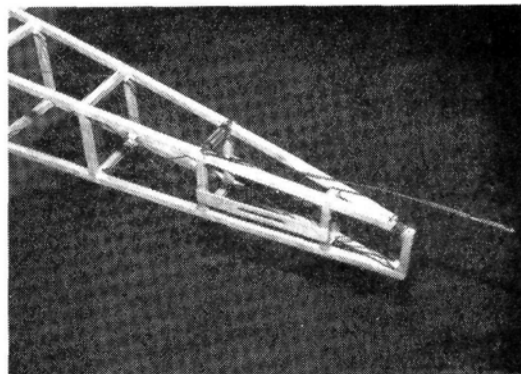
- Don't let my former friend fly your airplane!

**Here are the addresses of the companies mentioned in this article:*

Top Flite Models, 2635 S. Wabash Ave., Chicago, IL 60616.

K&B Manufacturing, 12152 Woodruff Ave., Downey, CA 90241.

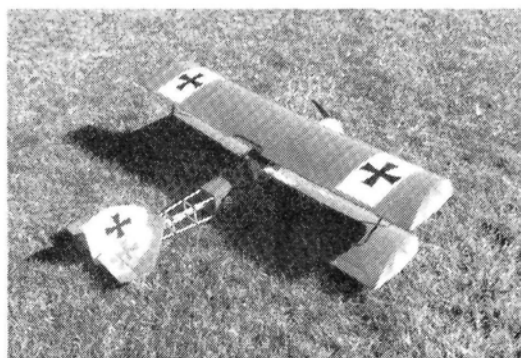
Slimline Manufacturing, P.O. Box 3295, Scottsdale, AZ 85257.



Wire tailskid installation. (See text for ground-handling impressions.)



Engine tucks away nicely in built-up balsa cowl. K&B is light, so additional nose weight was added to get the correct CG.



Decked out in the livery of a typical WW I German Scout, the Elder lends itself well to a variety of colors and markings. Stained, open framework is attractive.

Du-Bro Products, 480 Bonner Rd., Wauconda, IL 60084.

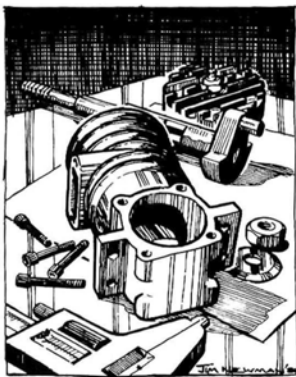
Williams Bros., 181 Pawnee St., San Marcos, CA 92069.

MonoKote; distributed by Top Flite.

Major Decals; distributed by Northeast Screen Graphics, P.O. Box 304, E. Longmeadow, MA 01028.

Loctite Corp., 4450 Cranwood Ct., Cleveland, OH 44128.

Harry Higley & Sons, Inc., 433 Arquilla Dr., Glenwood, IL 60425. ■



About Those En

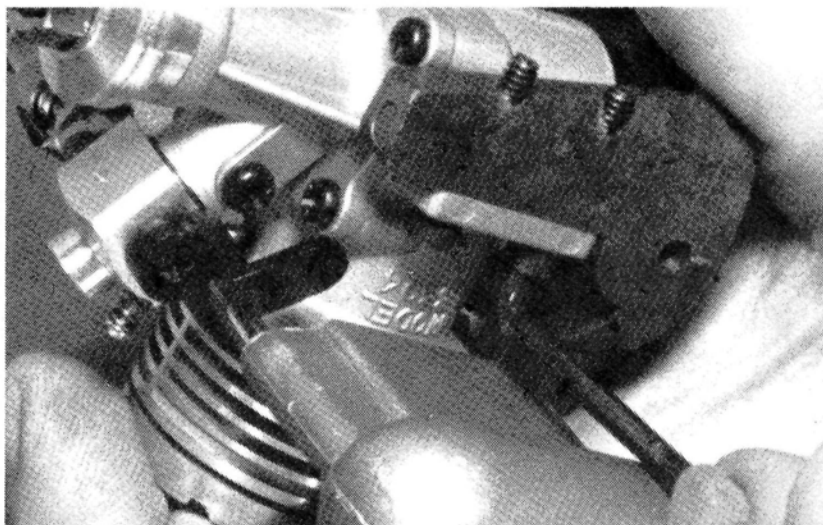
by JOE WAGNER

Screw types—good and not so good

"MINOR" DETAILS MAKE a difference! A friend recently complained, "There's something wrong with my engine, but I don't know what." He started it for me, and I could see that his motor lacked power and didn't respond well to throttle changes. "It was OK last weekend," my friend assured me.

I removed the engine from the airplane and found the trouble right away: *one loose backplate screw*. This was allowing crankcase pressure to escape on every piston down-stroke, and it probably allowed air to leak into the case, too. This is an excellent example of why model fliers should regularly check and (if necessary) tighten their engine screws—and the mounting bolts, too!

For even a simple job like tightening



Socket-head screws have several advantages over other styles. They can be tightened in awkward locations, as shown here. A shortened Allen wrench works well in tight quarters.

screws, however, you need to know a few "tricks." The screwdriver *must* fit the screw's slot snugly, and it must be sharp enough to stay in place while the screw is being *firmly* tightened. The driver's shaft must be aligned as closely as possible with the screw's axis. With Phillips-head



Re-forming screw heads. On the left is a "chewed-up" example; next to it is a repaired screw—almost like new again. The hammer is working on another.

Mail-away gaskets?

WHEN A CASE SCREW works loose, the gasket sometimes fails, too. "Factory-replacement" gaskets are often difficult to obtain, so making your own is usually the quickest way to get your motor back into service.

The annoying "reply cards" you find in most magazines are excellent for making home-brew gaskets. A sharp X-Acto knife cuts straight edges well, but smooth circular cuts are more easily made with a modified drafter's compass. Replace the "lead" in the compass with a length of same-size music wire that has been carefully ground and sharpened to a razor's edge.

When installing a homemade reply-card gasket, coat both sides of it with castor oil (medicinal grade is fine) to



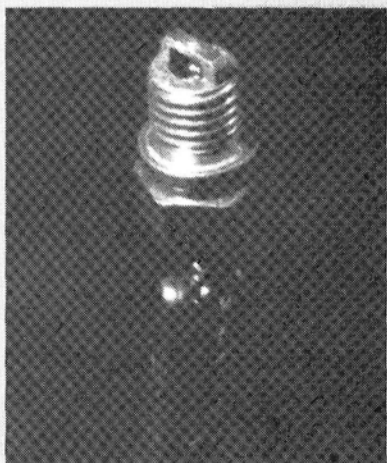
Cutting a "ring" gasket is easy with a modified compass. "Reply cards" furnish free material; a scrap of hardwood provides a firm backing for the job.

decrease the likelihood of leaks. The oil will seal tiny pores in the gasket itself, and any minor scratches in the mating surfaces; yet it will allow easy disassembly later, if that becomes necessary.

screws, it's particularly difficult to get the driver's bit to "bite" into the screw slot if the shaft is at an angle.

On model engines, "chewed" screw heads are all too common and result from the use of improper tools or a poor technique. They can, however, usually be fixed: a metal block in which there are holes to fit common screw sizes and a small ball-peen hammer will do this job

Are all plugs created equal?



A well-made "idle bar" glow-plug body is machined from a single piece of steel, as in this example. Welded-bar plugs can break!

THE CONSTRUCTION OF the glow plug is another "minor" detail that can make a big difference to your engine. If you use "idle-bar" plugs, make sure the bar was machined as an integral part of the plug's body. It *shouldn't* be welded on, as it is in some inexpensive glow plugs.

The tiny welded joints in a built-up glow plug's idle bar can loosen because of "thermal shock" and vibration—as I know from experience! Last summer, I was using a six-for-\$10 "bargain" glow plug, and my engine suddenly stopped in mid flight. I retrieved the plane and found that the motor wouldn't turn over.

I disassembled the engine at home, and I discovered that the plug's idle bar had fallen off and was jammed between the piston baffle and the head. I'm lucky that there was no major damage. A few strokes with Swiss Pattern files removed most of the scars the broken-off bar had made before it stopped the motor; but that's the last time I'll ever use a cheap welded-together glow plug!

easily. You just tap the deformed edges of the screw slot lightly until they're as they were originally.

Want an even better solution? Replace all the slotted screws with socket-head screws, which are available at most hobby shops and hardware stores in both Imperial and metric sizes. Socket-head screws are made of a hardened-steel alloy and are *much* stronger and far easier to "snug down" firmly. With tools like Du-Bro's* Ball Wrenches, you can tighten socket-head screws with up to 15 degrees offset between the screw and the driver.

Users of model engines are often advised to tighten the screws of a new engine immediately after it has been run once or twice. This is good advice—but don't do it while the engine is still hot! Let it cool first. When heated, aluminum expands much more than steel does. If you firmly tighten the screws on a cold motor, they'll tighten even more when the engine reaches operating temperature, and that's extra insurance against loosening.

Vibration can also loosen motor screws, and that's why Loctite* (and its clones) was invented. This works well on model engines, but many modelers hesitate to use it because they worry about not being able to disassemble the motor, if necessary. Thread-locking compounds are, however, thermoplastic, so they're easily softened by heat from a hot-air gun of the type we use for shrinking iron-on covering.

**Here are the addresses of the companies mentioned in this article:*

Du-Bro Products, 480 Bonner Rd., Wauconda, IL 60084.

Loctite Corp., 4450 Cranwood Ct., Cleveland, OH 44128. ■

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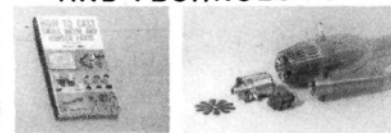
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QUIET FLIGHT

(Continued from page 65)

quite strong and isn't very heavy. The model is slightly smaller than usual, with a 68-inch span and 480 square inches. It uses an RPM 518 motor (Mabuchi can-type) on direct drive, with a Graupner* scimitar folding prop.

Performance was quite good on the recommended 7-cell pack, and it was easy to locate and utilize lift. Flights will easily last more than an average of 15 minutes, with multiple climbs on one charge. Watch for a complete review in a future

issue of MAN.

Sailplane Glossary

I found a glossary of sailplane terms in a very old Australian newsletter, and I thought you might enjoy it. I don't know where the definitions came from originally, but I had heard some before. I'll give you a few this month and more in the future.

Aircraft flight report: A loud noise accompanying the termination of an aircraft flight, usually preceded by a rapid descent.

Angle of zero lift: The angle immedi-

ately preceding an aircraft flight report.

Bulkhead: A derogatory expression applied to persons of questionable intelligence.

Butt joint: A disreputable establishment.

Cap strip: To remove one's headgear.

Lightening holes: The process of removing stuff from empty holes in order to reduce the weight thereof.

Nominal capacity: The amount of nominal which can be put in any given container.

Stable air: An atmosphere tinged with

(Continued on page 94)

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HELICOPTER SECTION

74 Merced '89 Helicopter Fun Fly

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90 Helicopter Challenge





Co-sponsor John Gorham shows his satisfaction while demo-flying GMP's newest release—Rebel. Aimed directly at beginners and modelers currently driving airplanes, the .40-powered fixed-pitch machine will utilize their standard engines and radios.

CALIFORNIA OFFERS R/C modelers a luxury that few states can provide — nearly perfect flying weather almost year-round. Californians can afford to have a more leisurely attitude toward their flying;

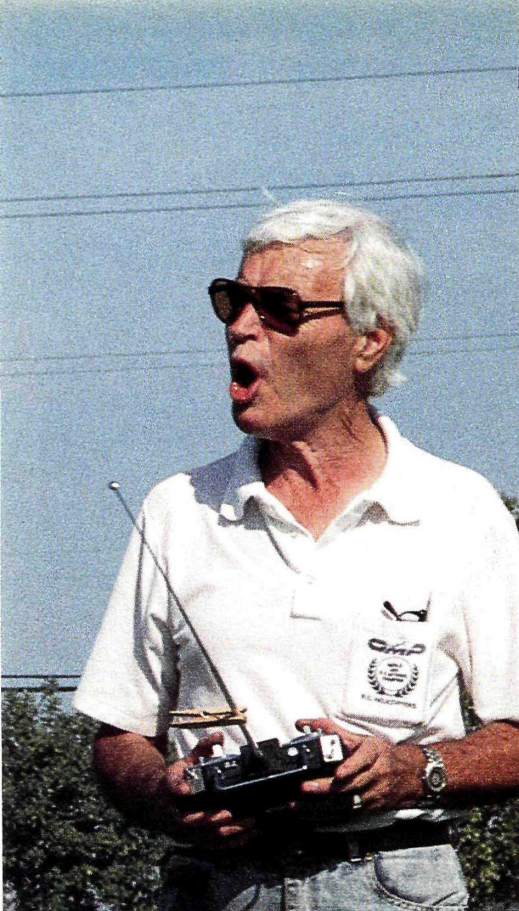
pressures to get together with other fliers on a sunny day aren't quite as intense as they are in the Midwest and East, where the weather is less reliable. When West Coasters do converge on a field to have fun, however, it's a doozie!

Merced, CA, home of long-time modeler and hobby-shop owner Chuck Winter, was the site of the Seventh Annual Helicopter Fun Fly on the weekend of September 23, '89. The grassy practice field of Merced Community College was transformed into a perfect helipad for the weekend event, and Merced County R/C Club members ran the transmitter impound and controlled the sale of raffle tickets, hats and shirts. Safety at the site was easily handled, because those who attended the event stayed within the designated pit, spectator and flying areas.

Since its first year, the Heli Fun Fly has been sponsored by Gorham Model Products and Hobby Castle (Chuck's shop). This site attracted a large turnout of Californians, as the



Miniature Aircraft X-Cell "at work." Fun, challenging event!



MERCED 1989 HELICOPTER FUN FLY

by DICK TRISTAO



Great weather and a terrific turnout made this Southern California event a big hit with heli fans

state's major metropolitan areas are all within a few hours' drive, but fliers also came from as far away as Canada, Washington, Oregon, Nevada, Arizona and Ohio!

Innovations

We saw some unique models: a specially designed camera ship; several scratch-built scale models and a miniature electric helicopter. The efforts of clever entrepreneurs have led to industrial uses for R/C helicopters. Eric Dustrude and his partner, James Smith, of Bellingham, WA, formed a company called Aerial Visions, and they aim to use their specially developed helis for high-quality low-level aerial photography (see sidebar).

Peter Chao of Century Imports



EH 2000 offers a challenge most can't ignore. This little chopper will probably find its way into many Midwestern and Eastern basements for continued winter fun. Peter Chao seemed comfortable flying the little guy.

PHOTOS BY DICK TRISTAO



An Echo 22cc engine powers Egmont Wedsky's scratch-built Hughes 300. About eight years of free time went into this model, as Egmont duplicated every component from factory drawings. He received a little help and lots of encouragement from monster helicopter modeler John Minnsian.

displayed and flew the soon-to-be-kitted EH 2000 electric helicopter. This metal mini-model's fixed-pitch rotor spans a mere 25 $\frac{1}{4}$ inches and weighs 13 ounces with a radio, but without its 1000mAh battery pack. The radio uses four channels with three miniservos and an electronic speed control, and two 280 motors power this minuscule chopper through 2 $\frac{1}{2}$ - to 3-minute flights.

When hovering, the EH 2000 looked stable in the cyclic but a little "swingy" on the tail (just as all choppers did before gyros). It should be available in January '90, at an approximate price of \$200 (which includes motors, but doesn't include radio and battery):

It's great to see scratch-building becoming part of the U.S. model helicopter scene. While there were superb examples of scale ships in the competition, I was particularly drawn to several really unusual machines that had obviously involved a lot of work. The monster-size Hughes 300 was difficult to ignore; just getting around it required a short walk! Egmont Wedsky of Ventura, CA, made the model from actual factory drawings, scaling them to fit an Echo 22cc 2-stroke. The 73-inch-long, 22-pound machine sports a 72 $\frac{1}{2}$ -inch-diameter main rotor and a 15-inch tail rotor.

Chromoly steel tubing makes up most of the chassis and landing gear, which sport oil-filled shock ab-



Nimble fingers and attention to detail separated the Helicopters at Work participants. Payload weight would drop off if maneuvers were anything but smooth and scale-like. Smallest chopper was a Cricket; largest was a scale Bell 222.



Folk huddled around machines to exchange thoughts and experiences. No rivalry among manufacturers or pilots; just a lot of friendly chatter.

PROFESSIONAL AERIAL PHOTOGRAPHY

THESE TALENTED entrepreneurs have taken the model helicopter into a realm where few dare to go. Who? Eric Dustrude and James Smith of Bellingham, WA, who have combined their interest in model helicopters with their still photography and video skills and formed their own company—Aerial Visions (1333 Lincoln St., Suite 382, Bellingham, WA 98226. Tel: (206) 734-4682).

It takes persistence and patience to get any business off the ground, but introducing a flying machine that's generally seen as a toy increases the challenge. Creativity and sweat is behind the company's production of a dependable, versatile helicopter that has gone beyond the model stage to become a dollar-earning "mule."

It took about six months to build and test the 27-pound, 70-inch-rotor helicopter. Most of its chassis mechanics were scratch-built using scaled-up dimensions from a variety of model designs. Hirobo and TSK main- and tail-rotor parts reduced the work needed in those areas. A Tartan twin provides the boost to get airborne and has ample power.

Custom-designed camera gimbals provide a wide, sweeping range and are controlled from the ground by R/C. One gimbal holds a medium-size video camcorder, while an adaptable one uses a video camera that's aimed through the viewfinder of a still camera. This combination



Designer/builder Eric Dustrude plans profitable ventures with his helicopter that's equipped with a still camera or a video camera. Tartan twin power lifts big machine to altitude, while camera operator views "downlink" video to position ship.

transmits a video signal down to James, who composes the photo and snaps the shutter. The results are magnificent!

Eric says obtaining contracts to photograph sites requires a lot of show-and-tell. Prospective customers are often indifferent to "yet another" aerial photographer—at least, until they see the helicopter, a portfolio of photos and an estimate that's usually *less than half* that quoted by pilots of full-scale planes. That usually gets their attention!

Eric also demonstrates a true roll-pitch-yaw autopilot that's being developed by John Moore, who's an ocean recovery specialist in the Washington area. The completely electronic device operates in much the same way as a gyro, but it senses three axes simultaneously. The difference is that a gyro stabilizes by preventing movement from its given reference point, but it can't interact with other stabilizing devices without causing oscillating interference. Also, a gyro can't be told to change its reference

point without moving the airframe first.

The true autopilot can be instructed, at will, to move reference points, to work together in harmony with axes that must remain fixed, and then to bring the airframe into the new position. This will allow, for example, the helicopter to be hovered, then rolled 15 degrees to the right for a better camera angle. The autopilot then operates all the necessary axis controls to hold the required attitude.

Development by John will soon lead to the addition of altitude control (collective) to the system, so further enhancing the already stable camera platform. Imagine hovering the helicopter, turning on the autopilot, then having it remain there untouched for extended periods. "So what?," you might say; "I can do that with my Champion right now—without the fancy electronics!" Sure, but can you do it when it's 500 feet overhead?

Good work Eric, James and John!

sorbers, and handmade body parts shape the huge canopy and fuel tanks. The power transmission has a scale appearance (including safety shrouds), and the tail rotor is driven by way of a torque tube (just like the full-scale machine).

Main- and tail-rotor hub assemblies were reworked to be more functional in model form, and a non-scale, two-blade, main rotor was incorporated. Egmont says the eight-year project is flown only under cool, perfect conditions, because it's quite underpowered.

HELI FUN FLY

During a walk along the flight line, I counted 265 model helicopters!

Silas Kwok of Belmont, CA, spent about two years constructing plugs, molds and fiberglass parts to form the shell of his SA 341 Gazelle. After that, he still had to build the ship and add the fine scale details necessary to achieve the results shown. This model's scale appearance is absolutely exquisite! Many hatches, ports and hinged covers are as operational as those on a full-size helicopter.

The Gazelle's cockpit area is a scale version of the full-size one and has an operational control stick and pedals. No mechanics, modified GMP, or radio components show anywhere in this model. A rear-start Enya is accessible through a hatch and pumps exhaust through a custom muffler system and out through the bottom of the fuselage. (This is the only actual deviation from scale.) Silas says the model flies very well at its 13-pound weight, but it doesn't get flown often. Wonder why!

Another scratch-built machine about which I was unable to get details (because I ran out of time!) was Cliff Cattrell's Hillman 360. This model looked darned good, and I apologize to Cliff for not being able to reveal more about his efforts.

Mighty Manufacturers

Most of the helicopters available today were represented at the Fun Fly. GMP's Legend probably accounted for 60 to 70 percent of the machines there. Around 10 or 15 percent were Miniature Aircraft's X-Cells, and Schluter, Kalt and Kyosho were also well represented. Futaba accounted for about 50 percent of the radios; Hobby Dynamics' JR for 30 to 35 percent; and the rest were by Airtronics. Top-end PCMs dominated radio types; they're expensive, so I was surprised to see so many in one flying compound.

Manufacturers were allowed about an hour for demos during the lunch breaks. On both days, experienced modelers and manufacturers' reps were kept busy helping those who needed it.

There was no rivalry at this meet; friendship and fun were much in evidence.

Heli Happening!

Activities began at sunrise on Saturday. The first day is always designated for open flying, and it draws the most entrants: 108 modelers registered to fly. With the help of good frequency control and considerate sportsmanship, the sky was filled with twisting, turning, autorotating machines all day, and, of course, there were many more in the pit. During a walk along the flight line, I counted 265 model helicopters, and someone asked if I was including the models in the nearby cars! I gave up!

Sunday brought another beautiful flying day to the valley and some machines were in the air at daybreak. Competitive events and scale judging began, but since this was a *fun* fly, the rules and judging were flexible. Chuck had close to \$3,000 worth of goodies to give away, so he had to come up with a way to make the folks work for it. All events were designed so that everyone (novice or expert) had an equal chance, and with the exception of scale and the autorotation event, this worked well.

Being unable to pass under a 3-foot-high streamer really humbles a hot-shot flier who can burn holes in the sky! Novice Hover, Progressive Helipad Landings, Ring Pick-up, Autorotation, Limbo and Scale (static judging only) were run against the clock, so all contestants had a fairly equal shot.

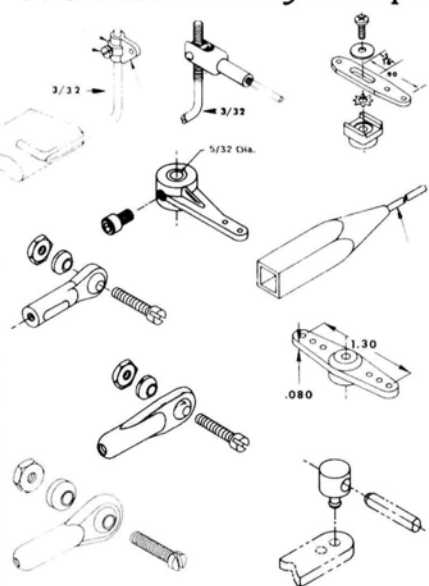
Prizes were awarded for the top 10 places and then some! In fact, everyone who entered left with something of value. The Scale and Helicopters at Work competitions offered high-dollar prizes for the top 10 slots and had the largest variety of entrants. Owing to a lack of time, Scale ended up as a static event, but, for obvious reasons, this didn't bother any of the entrants.

More than 25 signed up for Helis at Work, and it took most of the day. Pi-

(Continued on page 96)

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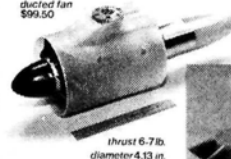
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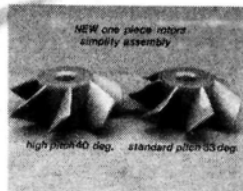
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Fly the nose, fly the tail, but fly the heli!

HELI FLIGHT

ORIENTATION

by DAVE HERBERT

AS A SENIOR FLIGHT instructor who has taught over 114 people to fly helicopters and fixed-wing aircraft during the last 10 years, I have established a fact: most of the crashes blamed on pilot error are actually caused by a student becoming disoriented with his aircraft.

Getting Your Bearings

Many (super-flier) instructors would have you think that flying is harder than it is; they don't give away any tips. I bend over backwards to teach my students the best way for them. The reason I'm a good pilot isn't that I'm super-coordinated or something; it's that I pretend I'm inside the cockpit when I fly. This is a lot more fun, too! It's fairly simple: just point the transmitter antenna in the general direction in which your plane, car, boat, or helo is going. When landing from left to right, point the transmitter down the runway and look over your left shoulder. This will save you in a "panic situation" when you have no time to think about which way is left or right. Just lean in the direction you're going.

Here are two examples that happened this past flying session. First, Ted Raubinger was on a training flight, with his son David instructing. Dave had Ted make a low, high-speed pass down the runway. Ted was looking over his left shoulder at first, but as the plane came closer to the runway, he turned and looked straight at it. *Left was now right and vice versa.* The plane began to veer to its right, and Ted gave more and more "left" to correct it. Unfortunately, he was actually feeding it more *right*, and it rolled upside-down and crashed into the dirt. Ted realized what he had done.

This also happened to my friend Bill Yates, who races full-size cars and holds the track record at Riverside. We



As an instructor, Dave has had ample opportunity to develop some sound training methods, which he discusses here.

Below: As the machine gets farther away from you, color tends to fade and contrast becomes more important—especially on overcast, gray days.



had an R/C hot-rod at the field and gave it to Bill to try. He roared up the road, made a nice U-turn, and started to come back. As he accelerated, he made a sharp right turn smack into the curb. You know what he had done: "right" was actually left when he was pointing the transmitter at the car. *You must stay oriented.* As you practice, your reactions will gradually become automatic.

Seeing your machine and recognizing its attitude is also a problem for many people. Some have poor eyesight, but won't admit it. I wrote the article "Night Flying, Believe It or Not" for RCM magazine back in 1982. Since aircraft have red lights on the left wing, and green on the right, at night it's easy to tell whether you're upside-down or in a right or left turn. Even my helicopters with chemical lights on the rotor blades are easy to see. (They look like the Starship Enterprise in the dark.)

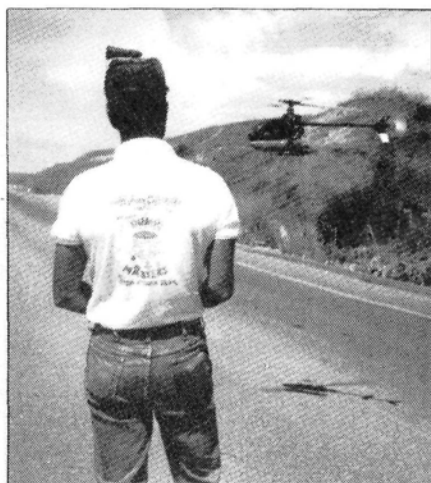
In daylight, however, especially on overcast days, a plane is often difficult to

see. When flown very high and far away, a plane's silhouette looks black, and if you're not careful, you can lose orientation. To solve this problem, I make the right wing easily recognizable from afar. Your AMA numbers, a large bull's-eye, a contrasting stripe, or the plane's name can be added for the learning stages. That way, if you fly the AMA left-hand pattern, you'll know your plane is in a left turn when you see writing or a design pop up on the "outboard" wing. Try it. This really works, and it's not cheating!

I Did it My Way

I've been told that I learned to fly a helicopter the wrong way—that I'm cheating! In fact, I fly well and I think it's easier to fly my way. I learned to fly helicopters after learning to fly fixed-wing aircraft, so it was hard for

Right: Pointing the transmitter antenna at the heli is one method of providing a visual cue to aid in orientation.



Below: To help the beginner develop better visual references, bright orange floats contrast with a darker, painted canopy.



Left: One of the advantages of helis over fixed-wing aircraft is that they can be flown in close.



me. I had to find an easy way to understand the helo's characteristics before I could fly confidently.

In those early days, John Simone, Jr. manufactured a kit of a helicopter called an American R/C Mantis. It had a belt drive, no collective pitch and no autorotation clutch. I first became involved with John when he asked me to fly the Byron F-16 jets in "Blue Thunder." The movie starred Roy Scheider and the Blue Thunder helicopter that shot down the F-16s.

After working with John on that picture, I wanted to learn to fly helicopters. He was the resident expert, and he taught me to fly exactly like he did; he "flies the tail" and so do I. What does that mean? When I talk to the "expert" fliers, they always ask, "Do you fly the nose or the tail?" Perturbed, I say, "I fly the machine. It doesn't matter *how* I fly it, as long as I can!" OK, there are pros and cons involved with both flying the nose and flying the tail. If you are having trouble with that tail, you may want to try to try it my way.

Flying the tail means that when you push right on the tail-rotor

stick (rudder), the tail goes to the right also. If you watch the rudder on a fixed-wing plane, it, too, moves to the right with a right-rudder stick. Since you must first learn to hover, though, knowing how to fly a fixed-wing plane won't help you to fly helicopters. During hovering, the nose is difficult to see because it doesn't move as much as the tail, so over-controlling is common. Several helicopter pilots, who tried to fly the nose during the learning process, didn't succeed until switching to the tail. It's much easier to learn that pushing the stick one way makes the tail go in the same direction. This is logical.

In my opinion, learning to fly the nose is like learning to fly fixed-wing aircraft with the elevator reversed. Down is up and up is down. It's OK in general, but during an emergency it's difficult for the beginner to remember. If you're having trouble with the tail, try it. Maybe the pros disagree, but who cares, if you can get some quality flying time.

Fabulous Floaties

Orientation is most difficult with a helicopter, and this is especially true when transitioning to forward flight. Most of my students hover very well, but when they go for their first laps around the field, they say, "It's too hard to see!" To help these beginners, I put orange pontoons on their helos. These pontoons are light and will float (and protect) electric helicopters. They're made from inflatable arm bands called "Floaties," which are usually used to keep young children afloat. Two sets of two come in a package (enough to make four pontoons). I got mine at K-Mart!

Use a good pair of scissors to cut them apart. Simply attach them to your stock landing gear with tape or rubber bands. They're really easy to see in overcast or low-light conditions. Take it from me—when you're learning, you need all the help you can get! Try these tips and relax a little.

The photos show my Kyosho Concept 30, which Bill Yates suggested I paint "stealth flat black" for even more contrast with the orange pontoons. I was doubtful, but it really helped! It's obvious from the photos that this is an easy-to-see Concept. So don't forget; if in doubt, roll out! Always remember what you did last, and no matter where you go, there you are. Happy Flying! ■

by MICHAEL FORTUNE

S C H L U T E R

CHAMPION H O P - U P

Off-the-shelf performance modifications for Schluter's standard

THE SCHLUTER* CHAMPION has been around for a while, and it's a more-than-adequate match for the newer machines. You can increase its performance with some "bolt-on" modifications.

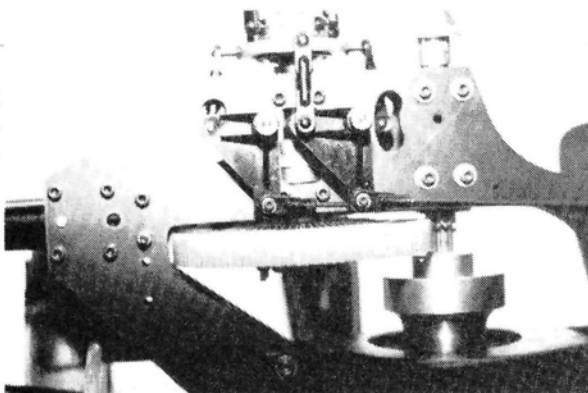
I'll start with the least expensive and easiest "hop-ups," some of which are for convenience, while others will increase your Champion's performance. I've included part numbers and prices. (Of course, your hobby shop may be able to beat these.)

Tighten Up!

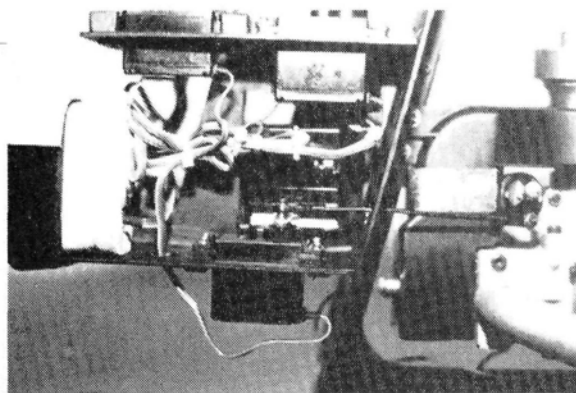
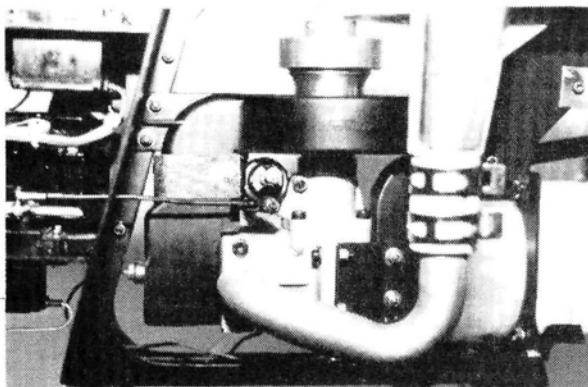
Whenever you use a 2mm screw to hold a ball link in place, put a small 2mm washer between the screw head and the ball. Now, no matter how violent the aerobatics or the "recovery," the ball link won't come off. Again, see photo 1.

Photo 2 shows a 2mm washer on the throttle-arm ball link. Photo no. 3 shows a 2mm washer on the throttle servo arm. Note the stand-off on the throttle arm, which is from a Rocket City* mounting hard-

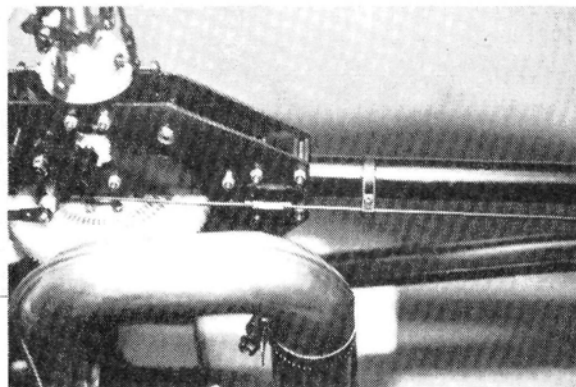
1. Lots of modifications here!
(See text for more details.)



2. Note the 2mm washer under the head of the 2mm bolt holding the ball link to the throttle arm.



3. Again, the 2mm washer and the head of the 2mm bolt holding the ball link to the servo arm. Also note the handy stand-off on the throttle arm (See text for Rocket City part number).



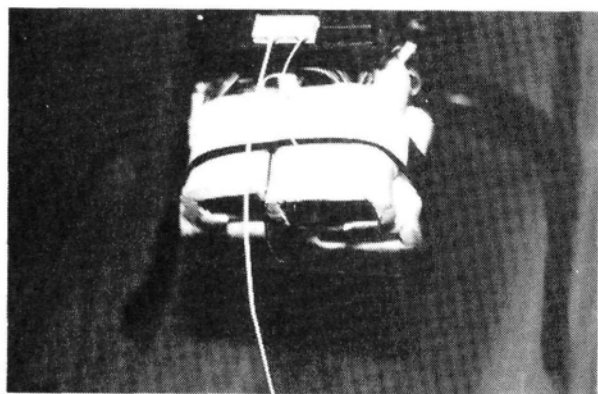
4. The tail-rod pushrod coupling has been moved forward by turning the pushrods around. Now it's better supported and less likely to break at the throttle.

PHOTOS BY MICHAEL FORTUNE

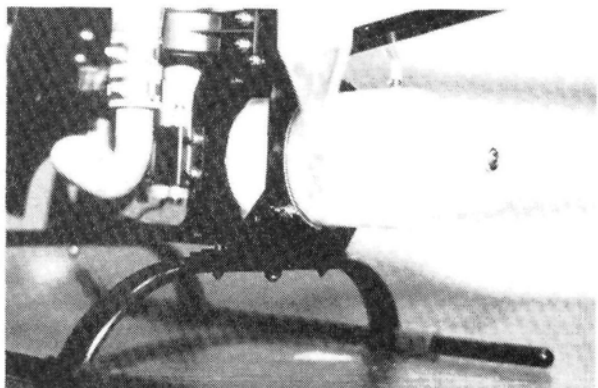
Tail-Boom Tenacity

Champion owners always fear that the tail boom will slide out from between the side frames. By screwing a small sheet-metal screw through the side frame and into the tail boom, you can "lock" the tail boom into position. Study photo no. 1 carefully. Notice anything different?

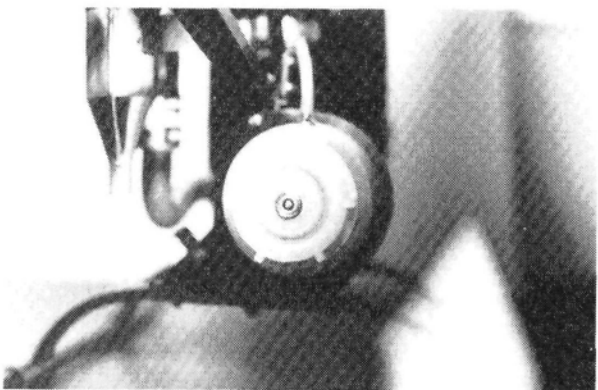
ware package (stock no. 88B). They come in packages of two for about 50 cents. Some other 2-56 hardware is included, but I buy the pack just for the stand-offs. Also note how the servo leads are *tie-wrapped* away from the throttle servo arm. Your wires shouldn't tangle with the servos; if they do, they won't live long!



5. Deans whip antenna installation. Foam is used around the receiver, battery, gyro amplifier and gyro 6V battery. Don't use servo tape, as shown in some advertisements.



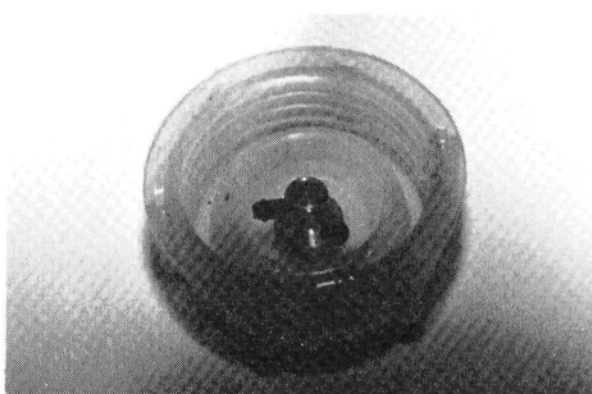
6. The Du-Bro fueling valve and Head-Lock remote jack installation.



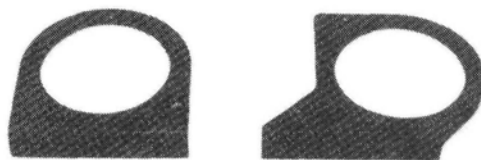
7. Aft looking forward: the Du-Bro fueling valve installation. Notice the fuel-tank vent at 12 o'clock position instead of 10 o'clock. This means more flying time!

Pushrod Mod

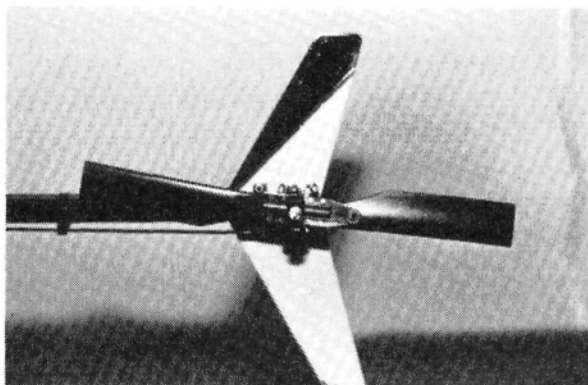
Look at photo 4. The plans don't show this bend in the tail-rotor pushrod, but it's shown on the top of the Champion's box. By turning the tail-rotor pushrods around, you position the pushrod coupling in front, along the side frames—in a "safe" place. If you make this bend, you'll have to buy new pushrods, because your pushrods will no longer line up. This raises a small problem: When the tail-rotor servo is run to the full-left position (pushrod forward), the forward edge of the coupling will hit the locknut for the forward tail-rotor-drive gearbox. Simply turn the bolt and locknut around so that the bolt's head is on the left-hand side (see photo 1). The new pushrod part numbers are: Schluter no. 356 (760mm long), and no. 3305 (300mm long). Photo 10



8. The Schluter fuel-tank cap with the Du-Bro fueling valve installed from inside. (See text for details.)



9. Original fuel-tank mount on the left and new offset tank mount on the right.



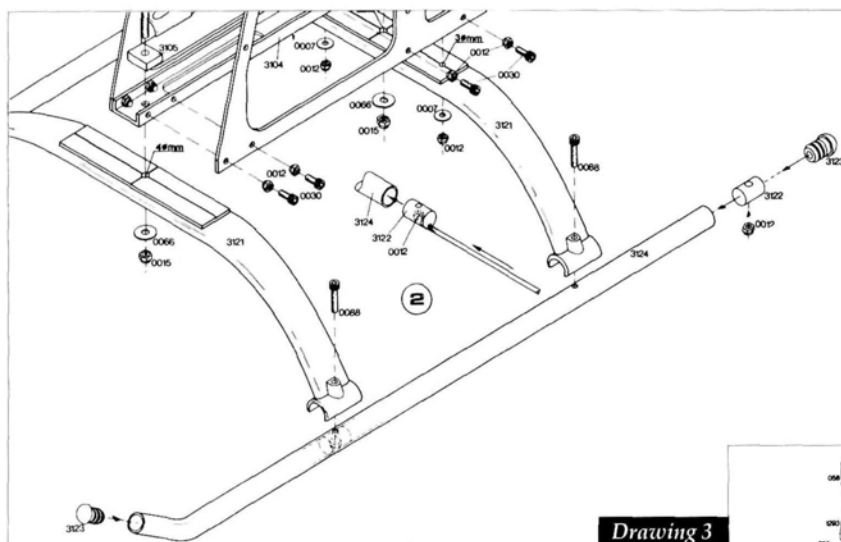
10. The Schluter two-bearing tail-rotor system (originally offered with the Schluter Superior helicopters).

shows a straight pushrod running to the tail-rotor gearbox. This costs about \$5.

Antenna Tip

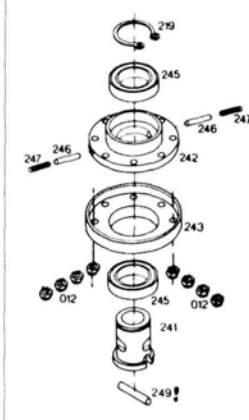
Photo 5 shows a Deans* whip antenna installed on the Champion's servo tray. Before I tried one, I was skeptical. If a 36-inch antenna gave the reception and range I needed, how could a 7-inch antenna do the same? Isn't more always better? Not always! The box mounted at the end of the 7-inch antenna puts a "load" on the whip that makes it as capable as the old 36-inch antenna. (For more information on whip antennas, see Joe Wagner's article in *MAN*, January '88.)

When using whip antennas, I've never had any problems with interference. The greatest benefit of using the

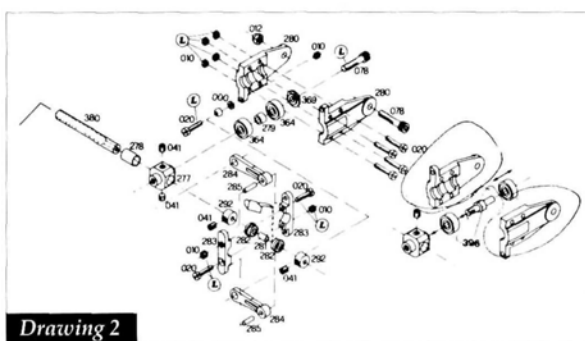
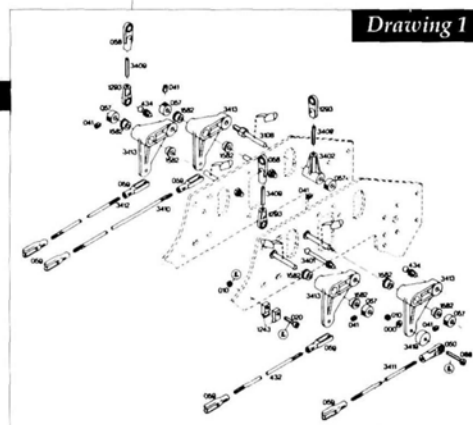


Drawing 3

Drawing 4



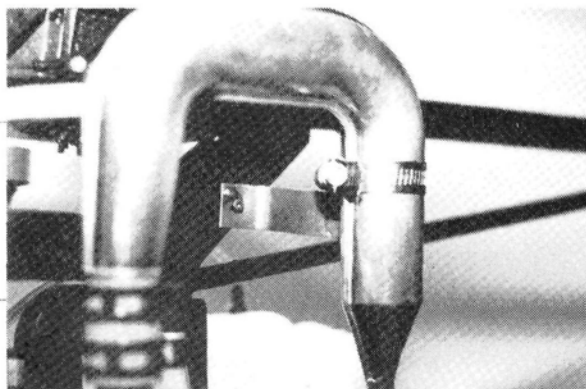
Drawing 1



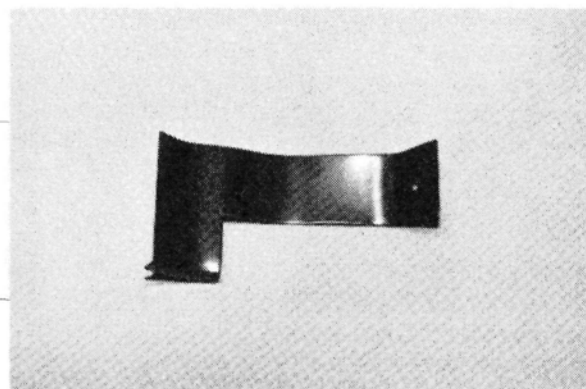
Drawing 2

See text for information on drawings.

11. Hatori tuned pipe with Byron Originals "jet" tuned mount.



12. Close-up of the tuned pipe mount. (See text for mounting details.)



shorter antenna is that you no longer have to worry about the rubber band that holds back the antenna to the vertical fin breaking during aerobatics and the antenna getting caught in the main blades. (This *did* happen to me—with disastrous effects on my stomach and legs!) As well as being safer, the short antenna also helps to give a helicopter a clean, uncluttered look.

Deans provides clear installation instructions and offers three kinds of whip antennas:

- 27MHz: has a blue lead and is for R/C cars.
- 50/54MHz: has a brown lead and is for those with "ham" licenses.
- 72MHz: has a white lead, and it's the one most heli pilots will need. It costs about \$8.

Remotely Accessible

On a Schluter helicopter, the engine faces forward. This presents a special problem: how can we attach the starting battery to the glow plug? Photo 2 shows how difficult it would be to attach the glow-plug connector to the glow plug. Using this method, you have to remove the canopy each time you want to start the engine and then replace it when the engine is running.

There's a better way! Why not use a remote "Head Lock"? We've all been spoiled by the push-on-and-quarter-turn-to-lock glow-plug connectors, and here's another of this type. The one shown is by Model Products Corporation* and, although it comes with a mounting bracket, I mounted mine in the fuel-tank bracket. To do this, I cut the wire going to the

(Continued on page 108)

helis on FLOATS

by TIM DIPERI

YET ANOTHER CHALLENGE FOR THE ROTARY-WING FLIER



PHOTOS BY TIM DIPERI

Floats can double as effective training gear, especially if used on closely cut grass. Repeated use on prepared, hard surfaces can be tough on inflatable floats, owing to abrasion.

SINCE I live on Long Island, NY, it seemed logical that I should set up some of my aircraft for amphibious use. I originally decided to experiment with floats (or pontoons) so that I could fly my helicopter from New York to Connecticut over Long Island Sound. (Of course, I'd only need the floats if the flight wasn't successful!) Installing these floats has taught me a lot, and the details of the crossing (which was a success) can be found in the October '89 Seaplane issue of *MAN*.

When using a float set (I used Kalt's*), there should be enough distance between the helicopter tail rotor and the water to allow for splashes during landings. To prevent the engine from stalling, make sure that the muffler isn't too close to the water. The center of gravity (CG) must be located directly in the middle of the floats, or the machine won't be level when it's in the water. An average CG ($1/2$ fuel tank) is probably the best choice. Unfortunately, I couldn't meet all these requirements with the floats I used. With all

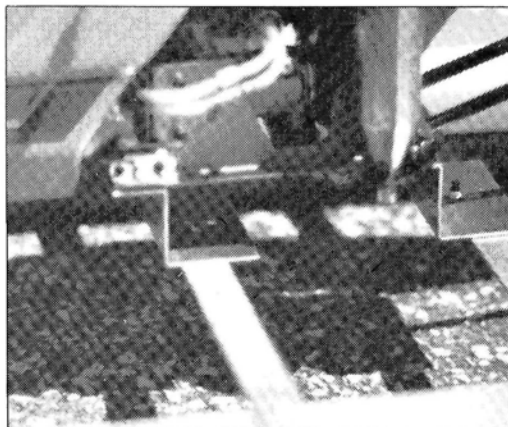
due respect to Kalt, I don't believe any floats could do this and still have a general application.

I pondered this problem for a while and decided that I needed a piece of rectangular sheet metal with a Z-bend. I needed a slot in one side to allow the entire helicopter to slide on the floats. When the proper balance point was found, I tightened the front and rear 3mm bolts in the slot so that the machine was rigidly attached to the floats. This worked well because any machine attached to my sliding adapter can use the same set of pontoons.

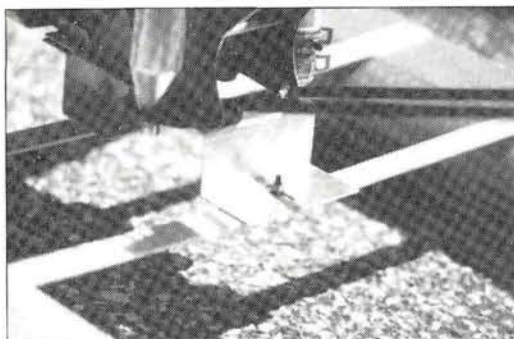
The addition of floats did change some aspects of flying, but I was surprised that they made almost no difference to hovering. I had expected the machine to be less stable because the floats would "catch" the wind. In fact, this was offset by the weight increase below the center line, so the floats didn't reduce stability.

While flying circuits, I noticed a definite reduction in horizontal speed, but maneuverability wasn't sacrificed. Although I didn't try inverted flight, I doubt that there would have been any problems.

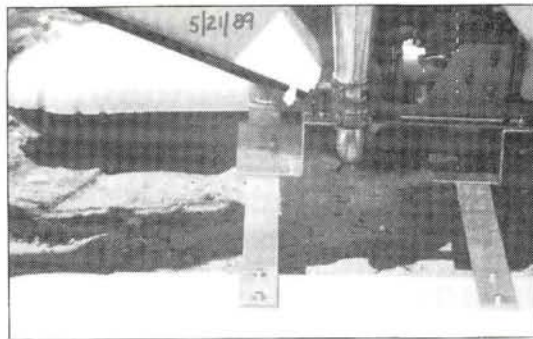
Using floats, some pilots



Simple Z-brackets anchored to heli frame provide adequate attachment points.



Floats are connected to each other by flat steel or aluminum stock, which is usually supplied with the floats. Two Z-brackets can be clearly seen.

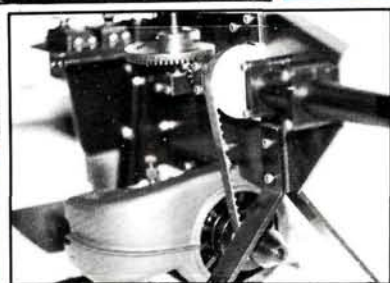


Floats can double as effective training gear, especially if used on closely cut grass. Repeated use on prepared, hard surfaces can be tough on inflatable floats, owing to abrasion.

MEET THE CHALLENGE !



WITH THE NEW GMP REBEL



GMP introduces the Rebel, a new very low cost R/C helicopter designed to give the entry level modeler the most stable and easiest to fly R/C helicopter in the world. Rebel can be flown with a low cost airplane 4 channel radio and a .40 - .50 airplane engine.

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**ANOTHER GREAT RC HELICOPTER
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might experience some changes during hard landings. A slightly hard, drop landing (caused by inexperience or running out of blade speed during an auto), will "bounce" a helicopter back into the air. The machine can actually roll onto its side when this happens. When landing on water, "bouncing" is less of a problem, but you should be aware of it.

When first throttling up to take off from water, the helicopter tail rotor seems ineffective, owing to the initial torque input to the system without the familiar ground friction. When the system catches up, additional tail-rotor control is needed even while the machine is on water. Remember, as far as yaw control is concerned, the machine is flying and must be controlled even while resting on the water. This is a great training aid for pilots who want to become familiar with the controls while at a safe altitude (zero feet!).

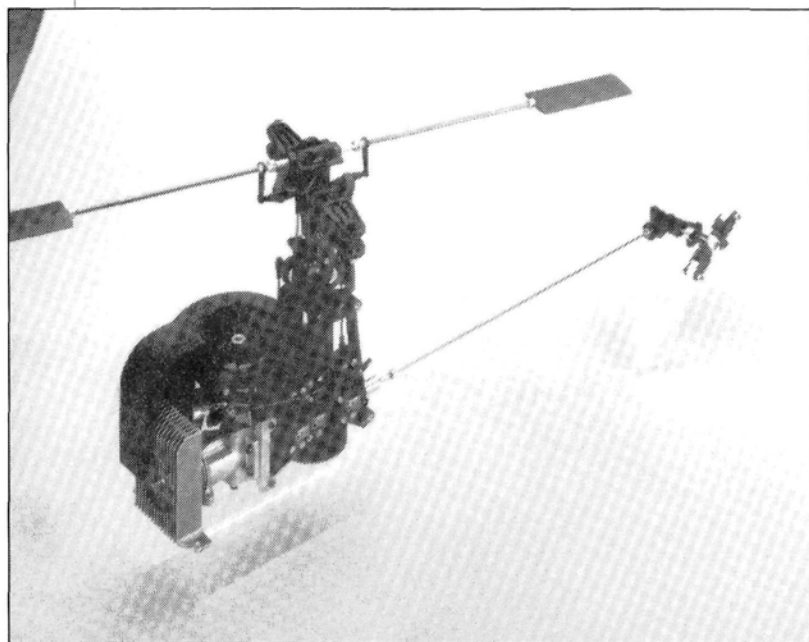
Floats can also be used on snow. Running takeoffs and landings are loads of fun. High-speed landings, like fixed-wing landings, can be done safely, and they can be combined with a ground pirouette or two!

No matter what the season, an expert or beginner can have a lot of fun with a helicopter on floats.

**Here is the address of the company mentioned in this article:*

Kalt; distributed Hobby Dynamics, 4105 Fieldstone, Champaign, IL 61821. ■

ROTARY-WING ROUNDUP



ROBBE Pro-Mechanik

Years of development and Ewald Heim's experience as a top R/C helicopter pilot and designer went into the new Robbe/Heim Pro-Mechanik, which continues the design used in the Robbe Avantegard and the Ecureuil helicopter. The Pro-Mechanik is serviceable, versatile and lightweight. Its compact and clearly arranged design accepts high-power rear-exhaust engines or standard side-exhaust types. It also includes: cooling-duct housing; a top-mounted radial cooling fan with integrated starting hub; eight mounting points; efficient two-step gear reduction; six servo mounts integrated in chassis frames to create a rigid, compact unit with short control pushrods; precise controls to main and tail rotor; a Bell/Hiller mixing system with

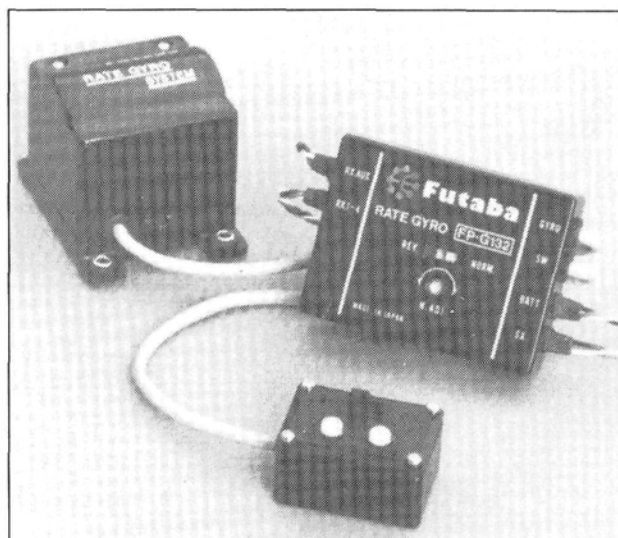
collective-pitch control; fully aerobatic main rotor system; a one-piece tail-rotor gearbox; dual ball-bearing blade holders with fully dampened hub; and autorotation with a driven tail rotor.

For more information, contact Robbe Model Sport, Inc., 180 Township Line Road, Belle Mead, NJ 08502.

FUTABA Voltage-Regulated Rate Gyro

Futaba's new, single-axis Gyro Systems offer voltage regulation to stabilize R/C model aircraft precisely. The Futaba Gyro Systems function exactly like real aviation gyros, detecting, and automatically correcting, motion along a pre-determined axis. Both the G132 (Standard Futaba) and G152 (J-Series) gyros can be positioned for correction of yaw, roll or pitch in helicopters or airplanes.

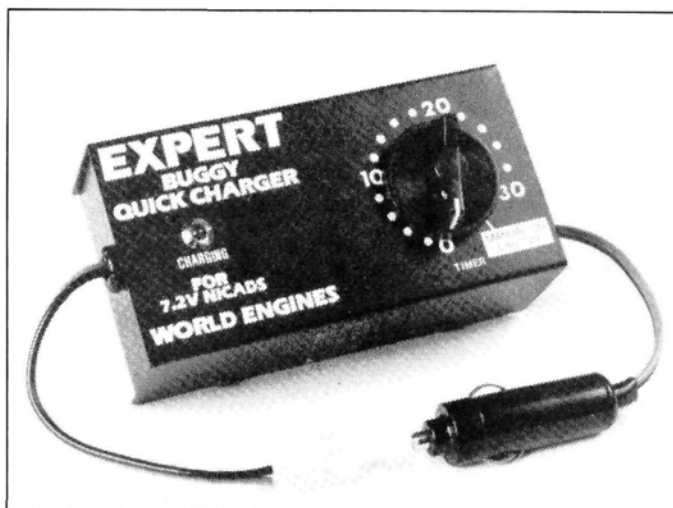
For more information, contact Futaba Corp. of America, 4 Studebaker, Irvine, CA 92718.



WORLD ENGINES Quick Charger

The Expert D/C Quick Charger from World Engines Inc. is a simple, affordable way to charge 7.2V rechargeable battery packs. It features a 0- to 30-minute timer that automatically switches to trickle-charge when the fast-charge cycle has been completed. The Expert D/C Quick Charger has fused circuitry and requires a 12V DC power supply. It sells for \$17.95.

For more information, contact World Engines Inc., 8960 Rossash Rd., Cincinnati, OH 45236.



DEVCON Super Glue Applicator

To help modelers apply its popular Super Glue precisely and neatly, Devcon Consumer Division has introduced a new applicator. The push-button-controlled plastic container permits safe, mess-free application. Devcon Super Glue is especially effective in instantly bonding metal, ceramics and rigid plastics. The new refillable applicator and one 2-gram Super Glue cartridge sell for \$2.99. A package of two replacement cartridges also costs \$2.99.

For more information, contact Devcon Corp., Consumer Division, 780 A.E.C. Drive, Wood Dale, IL 60191.



HOBBY DYNAMICS Excalibur Helicopter

The Kalt Excalibur is designed for the U.S. style of flying and makes a perfect FAI-type competition helicopter. This .60-size heli features a K-5 rotor head, an ABS plastic body, a tinted windshield, an autorotation system, K-series weighted rotor blades and a new shaft-start system, which eliminates starting belts. All necessary control linkages and hardware, including a fuel tank, are included. The Excalibur uses a .60 engine and a 5-channel helicopter radio system, and a gyro is recommended. Its flying weight is 9.5 to 10.5 pounds, and the diameter of the main rotor is 58 inches.

For more information, contact Hobby Dynamics, 4105 Fieldstone, Champaign, IL 61821.



Helicopter Challenge

by CRAIG HATH

A BEGINNER'S GUIDE

SO YOU WANT to fly R/C model helicopters? Your interest in those radio-controlled rotary wings has been piqued, and now you want a good, basic outline to get started. Well, read on!

Bare Essentials

Naturally, you'll need a model helicopter kit. (See the section on selecting an R/C model helicopter.) Some of your other decisions, such as engine selection, muffler and radio system, will depend on the helicopter you choose, so pick the machine first.

Your engine will probably be a 2-stroke powerplant, and these range in size from .25 to .61 cubic inches. (The size of the engine depends on the helicopter.) All engines suitable for use in R/C helicopters have full throttling capabilities, and they run from approximately 3000rpm at idle to 15,000rpm or so at full power. These engines require a special fuel of alcohol blended with a



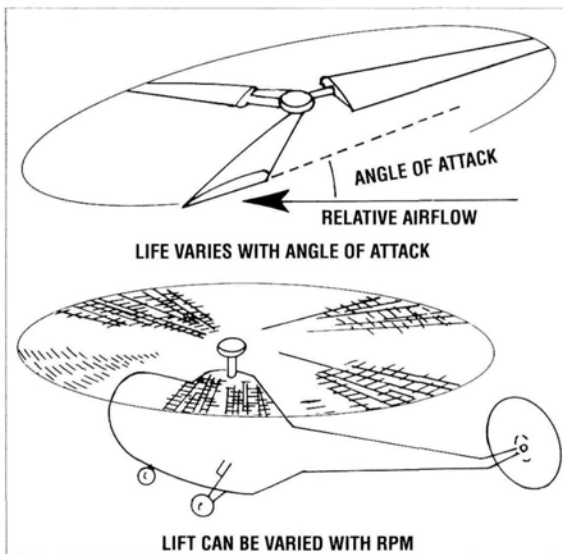
The Rebel, from Gorham Model Products, is a great helicopter for novice heli fliers.

HOW TO SELECT AN R/C MODEL HELICOPTER

WHEN YOU'RE GETTING started with R/C helicopters, you must decide which brand, type and size of model you want. Here are some tips that might help you make up your mind.

First, you must choose between a helicopter with collective pitch and one with fixed pitch. "Collective pitch" refers to a system in which the main rotor blades move around the airfoil axis, and this causes lift to increase or decrease as the rotor blades move up or down. The result is that the rotor speed is fairly constant while the throttle of the engine is opened and closed during the flight, yet the helicopter will climb and dive on command. "Fixed pitch" refers to a system in which the main rotor blades are set at a fixed angle of attack, or pitch. By increasing the throttle setting, the speed of the main rotor increases, and this creates more lift; thus, lift varies with the speed of the main rotor disc.

The collective-pitch machine is more responsive to throttle commands, especially when it's well-tuned; ultimately, this translates



These drawings show the two methods of creating lift. The top example shows a collective-pitch system, and the bottom illustrates a fixed-pitch system.

into a helicopter that's easier to fly and much more capable of aerobatics, especially inverted flight. Unfortunately, the mechanics of the system complicate what already seems to be a very complicated arrangement. Most kits with collective pitch have good, dependable collec-

small percentage of oil and nitromethane.

Ignition is handled by a glow plug, which is similar to a car's spark plug. It contains a special coiled element that's heated by a 1.2 to 2V battery until it glows. After the engine has started, internal engine heat keeps the glow plug hot, and the battery is removed. For almost every type of model available, the engine must be started with an electric starter motor, and this is usually powered by a small motorcycle battery.

As for R/C systems, I advise you to buy the best radio that you can afford. Make certain that the unit is designed for use with helicopters. The radio's resale value increases with its sophistication, and a set that's intended for use with helicopters has features that will actually make the helicopter easier to fly. (More on this next



Distributed by Hobby Dynamics, the Kalt Cyclone II is a pre-assembled, ready-to-fly chopper.

month.)

So you'll need a helicopter, an engine, a radio system, a glow-plug ignition battery, an electric starter motor, a small motorcycle battery for the starter motor, an extra glow plug or two, and at least a gallon of glow fuel to get started.

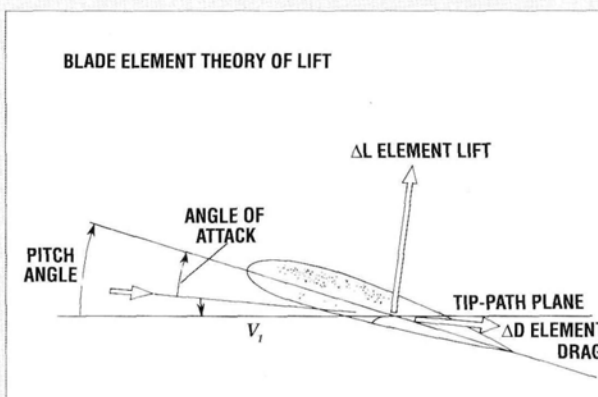
Next month, I'll tell you about some of the not-so-necessary, but very handy, items. See you then! ■

tive-pitch mechanisms and have few bugs, if any, to overcome.

Fixed-pitch machines are much easier to assemble and trim, but they can be sluggish and unresponsive to the controls, because you must wait for the speed of the main rotor disc to change enough to affect lift. Generally, the decrease in performance far outweighs the advantage of reduced complexity, but if you're concerned about having too many nuts and bolts and you want to give choppers a try, fixed pitch may be the way to go.

The next consideration is size. Generally, you'll find that the larger the machine, the smoother and more predictable are its flight characteristics. Obviously, larger machines cost more, and you must be prepared for this. A few manufacturers are producing some very good, smaller machines that come close to bridging the gap in stability; so if your budget is limited, it might pay to investigate the .25- to .30-size machines.

Finally, you must choose between a pre-assembled helicopter and a basic kit. Assembling a helicopter from a kit gives you intimate knowledge of the model's operation. This really comes in handy if you crash: repairs are



This drawing shows the influence of angle of attack on lift.

easier if you know how the model was put together in the first place! Pre-assembled machines get you into the air quickly. Remember, however, that you'll crash the helicopter sooner or later, and then you'll get a quick lesson on the mechanics of the kit—the hard way!

I hope I've answered some of your basic questions; now get out there and select your first R/C helicopter!

ILLUSTRATIONS BY JOHN FAY AND GEORGE H. SAUNDERS

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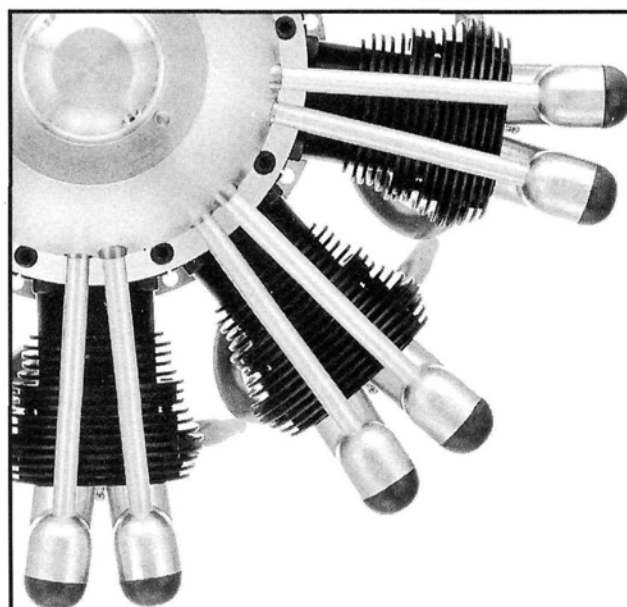


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QUIET FLIGHT

(Continued from page 70)

the odor of fertilizer.

Vacuum: A place with nothing in it.

Vacuum pump: A gadget used to inject nothing into a vacuum.

High start: The condition in which one leaves a bar.

Two-minute precision: A surgical cut made two minutes before the actual operation.

Moment of inertia: A short period of hesitancy.

Till next time...good thermals and a full charge!

*Here are the addresses of the companies mentioned in this article:

Airtronics, Inc., 11 Autry, Irvine, CA 92718.

Sailplanes International, distributed by Global Hobbies, 10725 Ellis Ave., Fountain Valley, CA 92728.

Carl Goldberg Models, Inc., 4734 W. Chicago Ave., Chicago, IL 60651.

Combat Models, Inc., Fightertown U.S.A., 8535 Arjons Drive, Suite R, Miramar, CA 92126.

Du-Bro Products, 480 Bonner Rd., Wauconda, IL 60084.

Sports Aviation, distributed by Global Hobbies, 18480 Bandilier Circle, Fountain Valley, CA 92708.

Graupner, distributed by Hobby Lobby International, 5614 Franklin Pike Cr., P.O. Box 285, Brentwood, TN 37027.

MINI CHALLENGER

(Continued from page 53)

drop a wing and spin if slowed too much in a turn. In fact, it's so responsive to the controls that over-correcting for a spin led to a pronounced see-saw effect. By cutting the motor and dropping the nose to gain speed, I smoothed out the flight path.

For an in-flight test of balance, I trimmed the model for hands-off flat glide and, with the motor off, I pushed the stick forward for a 45-degree dive. I let the stick snap back, and the model zoomed up sharply, indicating that it had been correctly trimmed to compensate for a heavy nose. A gentle return to level flight is what I was looking for here, and a tendency to continue the dive or tuck under would have indicated a tail-heavy trim.

Hmmmm...eight clicks of up in the glide tests, and nose-heavy in the flight tests: sounds like a CG location problem. By moving the power battery back by 1/2 inch, I moved the CG back to 1/4 inch behind the CG point shown on the plans. As the kit's instructions tell you, "You never need to add weight to an electric. Just keep moving things until the model balances correctly." To reduce tip-stall problems, I also added wing washout

(Continued on page 96)

Wingspan 92 in.
Wing Area 1420 sq. in.
Length Overall 74.25 in.
Weight 18-24 lbs.
Engine Quadra Q-35, Q-40, similar
All-wood construction; no foam cowl,
canopy & spinner available



Hawker
Sea Fury



Wingspan 92 in.
Wing Area 1800 sq. in.
Length Overall 81 in.
Weight 28-32 lbs.
Engine 3.4 - 4.2 cu. in.
All-wood construction; no
foam cowl, canopy & spinner
available

P-47



Wingspan 92 in.
Wing Area 1750 sq. in.
Length Overall 78 in.
Weight 26 - 32 lbs.
Engine 2.4-3.7 cu. in.
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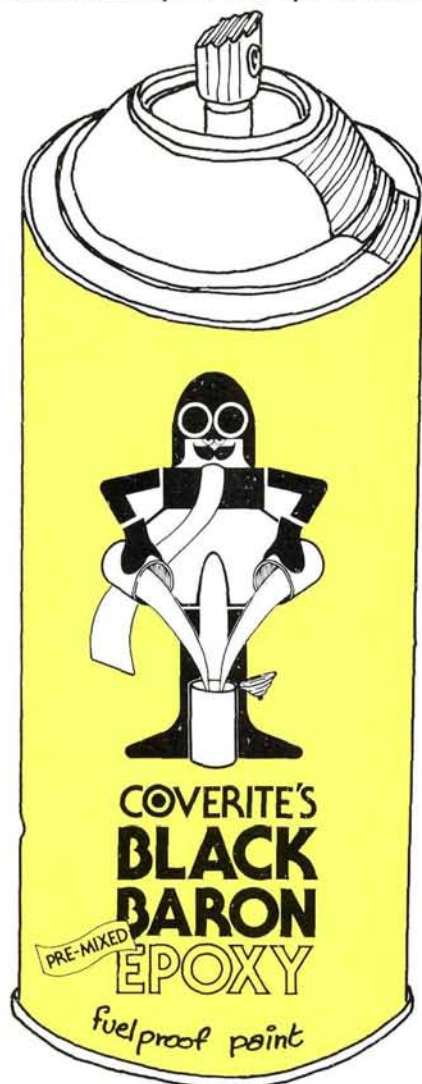
1/3	11/16" & 1"	8.50	1/8	1/4" & 3/8"	5.50
1/4	1/2" & 3/4"	8.50	1/9	7/32" & 5/16"	5.50
1/5	3/8" & 5/8"	6.50	1/10	3/16" & 5/16"	5.50
1/6	5/16" & 1/2"	6.50	1/12	5/32" & 1/4"	5.50
1/7	9/32" & 7/16"	6.50			

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MINI CHALLENGER

(Continued from page 94)

(wing tips up $\frac{3}{8}$ inch at the trailing edge). After I had made these changes, my model flew smoothly and predictably. A $\frac{1}{2}$ -inch rudder throw each way and a $\frac{3}{16}$ -inch elevator throw up and down work well.

The Mini Challenger is fast and responsive. Since it's light and high-powered, it will sustain a 45-degree climb, and that's outstanding for an electric glider. I usually shut off the motor 60 to 70 seconds after launching it, because the model gets up to about 600 feet and becomes too small to see easily.

How's the glide performance with the motor battery on board? Very nice! During construction, I wondered how the 60-inch wing would handle gliding, and I was pleasantly surprised by the Mini Challenger's flat glide and its ability to make use of light lift. I was also surprised at how well it handles in wind—much easier than 2-meter motor gliders.

With superior climbing ability, maneuverability, flat glide, and ability to handle wind, Astro Flight's Mini Challenger has the makings of a competitive, electric, contest ship. If you want a model that will out-climb anything else packing six cells and still catch a thermal, consider building Astro Flight's pocket rocket.

*Here are the addresses of the companies mentioned in this article:

Astro Flight, 13311 Beach Avenue, Marina Del Rey, CA 90292.

Top Flite Models, 2635 S. Wabash Ave., Chicago, IL 60616.

Hobby Lobby International, 5614 Franklin Pike Circle, Brentwood, TN 37027.

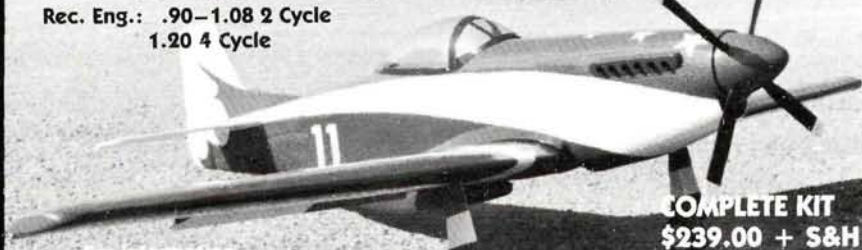
Futaba Corp. of America, 4 Studebaker, Irvine, CA 92718.

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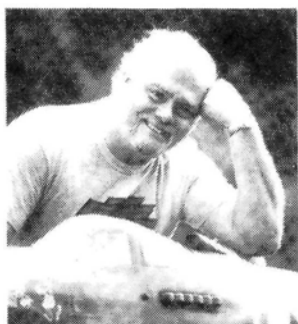
SPORTS SCALE AT ITS BEST

HELI FUN FLY

(Continued from page 79)

lots had to pick up a weight (2 pounds for large machines; 1 pound for little guys) from a card table, fly one circuit, deposit the weight on a second table and then land on a third. The weight was attached to a sling that could be adjusted to fit most helicopters and was designed to fall off easily if it came into contact with anything, or if a helicopter maneuvered too fast. The clock started at liftoff and stopped on landing. Points were awarded

(Continued on page 105)



Sporty Scale Ted

by FRANK TIANO

A REPORT FROM THE TRENCHES!

BOY, OH BOY, have I been busy the last few weeks! Since the U.S. Scale Masters Championship, it seems that I haven't had a free moment. In fact, I was just about to call the Colonel and ask him if the Masters coverage would be enough for this month; you know, let "Sporty Scale" slide. Well, that was like cheating Dracula out of a few pints of blood! Thank goodness my old friend Norm Berger sent in a few pictures and some information on what's happening in the scale circles.

Norm discovered a guy from Burbank, CA, who, somehow, has gone unnoticed for the past 10 years. His name is Bob Lanthier and he owns a company called Eagle Squadron R/C Models*. Bob builds very large display models for corporations



Gene Barton displays his Top Gun entry, an 89-inch Douglas Sky Raider. Exact-scale landing gear and wheel hubs; powered by Webra Bully, it weights 35 pounds.

to hang in their lobbies or executive offices. His 12-foot DC-3 hangs from the ceiling in one of the restaurants in Miami's airport! As impressive as this aircraft is, you ain't seen nothing till you've seen his 19-foot Boeing model 314 Pan Am Clipper. Bob says that it took him 14 months to scratch-build the Clipper, and it's flying weight is 165 pounds, although no one intends to fly the thing! For display purposes, the model has four constant-power

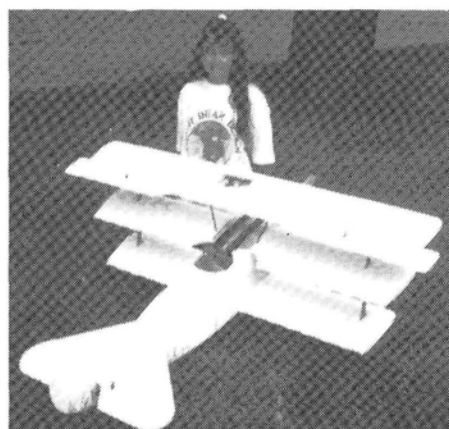
electric motors turning scale props, but it was designed to handle four Zenoah G-62 gas burners. Bob's just waiting for the guy who wants him to build a 1/4-scale B-17 Flying Fortress! If any of you are so inclined, give him a call!

Beautiful Bipes

Robert Curry, from Woodstock, NY, sent some photos of his two favorite biplanes. Bob is shown holding his ARC (Almost Ready to Cover) Pica Jungmeister and Bob's daughter, Erin, poses next to her dad's ARP (Almost Ready to Paint) Ziroli DR1, kitted by Hangar One. The Yungy uses an O.S. .90 4-stroker while the Triplane uses a reliable Zenoah G-38. These are just two ways that you can get into scale modeling without spending a small fortune. Both airplanes fly gently and are easily documented with a multitude of color schemes.

Ask and Ye Shall Receive!

I once asked why some radio manufacturer hasn't come out with a radio for us scale modelers. Well, I'm delighted to tell



Bob Curry and daughter Erin show two examples of how easy it is to get started in scale modeling. Pica Jungmeister is 1/5-scale, as is Fokker DR1 Triplane. Both are great fliers!

you that I received a call from Jack Albrecht of Airtronics*. He informed me that the Airtronics engineers read this column with interest, and they've introduced a new radio system—the Vision. I won't try to sell you this radio, but I will tell you that I ordered one, paid for it with my own bread, and installed it in my KI-61 Tony. I read the instruction manual, a little intimidated at first, and then applied what I read to the transmitter functions. Aside from the usual four channels, I have the retract switch on the upper right corner, the flaps controlled by a right slider, and my tank drop controlled by the left slider—everything right where I like it—and there's even a free toggle switch just waiting to be used for something else. I can switch to mode backwards by flipping a couple of switches in the back of the tranny. It really is a great unit for scale enthusiasts, and I commend Airtronics for not only listening, but for doing something for us!

There's another great company that only a select few seem to know about—Aeroloft Designs*. How many times have you seen a really slick scale model with intricate markings that look like they've been professionally applied? Like those hot, jet-fighter badges and emblems, or maybe those Blue Angels markings that seem to fit that particular model to a tee? Well, Aeroloft makes these markings to order! Just send them an idea of what you want, tell them the scale or size, and they'll whip them right up. Dennis Crooks used these fabulous markings on his A+ Tom Cat; Charlie Chambers put them on his F-18; and Shailesh Patel had a set of special markings made for his unique F-4 Phantom in bicentennial colors. These are dry transfers, not decals, and they work just like rub-off lettering does. They work over rivets and panel lines, are extremely flexible, very thin and have excellent color matching. If your newest project is craving some outstanding markings, Aeroloft is for you! Drop them a line.



Bob Lanthier's incredible Boeing 314 Pan Am Clipper. It features a wingspan of 19 feet and is 13.5 feet long.

Top Gun Tizzy

Since we're getting close to April, I thought I'd bring you up to date on the Top Gun Invitational Competition. You'll find an announcement for Top Gun elsewhere in this issue; read it carefully! As you know, last year's event proved to be the premier scale contest in the U.S. Not only were the pilots some of the best in the country, the event was absolutely first-class, and this year, the Top Gun board has gone out of its way to make it even better! More than 50 of the hottest pilots and airplanes in North America will compete for some real bucks, great merchandise and, of course, the ultimate bragging rights.

Unlike other scale contests you may have been to, Top Gun lets you get close to the action. Spectators will be allowed in the pit area at selected times for picture-taking and conversation with the pilots and officials. Since static judging will go on for two days this year, there's an even greater opportunity for you to see the aircraft up close. As a spectator at Top Gun, you can buy dinner/dance tickets and fraternize with competitors and sponsors alike. It's a chance in a million to meet your favorite magazine authors and editors. The four-day event is geared entirely toward scale airplanes, and you know that when *Model Airplane News* and Pacer Technology do anything, they do it first class! Members of the host club, the Ari-

zona Model Aviators, are real pros at putting together events of this magnitude, and they've already cleared enough parking area for thousands of cars. Yes, there's space for your RV; just call the Top Gun Hotline, and we'll give you the skinny.

More than 75 percent of the aircraft at this year's event have been built specifically for the Top Gun rules. For the first time, we have some Team Scale entires, so you'll see some aircraft that have never been modeled before! Just to tease you: picture at least a dozen jets (many of them with twin engines), a 100-inch B-25, an 85-inch Sea Fury and possibly a squadron of Skyraiders. Look for some new civilian aircraft, too, like an outstanding Reno T-6, a fantastic deHavilland Rapide and one of the most perfect 1/3-scale J-3 Cubs you've ever seen! There will also be surprise demonstration flights by some of the best pilots in the world.

The headquarters hotel is the Arizona Golf Resort, and special rates are available; just be sure to mention Top Gun. I believe the rates are in the \$60 range, but if you need something a bit less expensive, give the Mesa Chamber of Commerce* a jingle. Tell them you need Top Gun accommodations, and they'll fix you right up. With all the cash, merchandise, fun and excitement, it promises to be a fabulous time for everybody...and isn't that what this sport of ours is all about?

(Continued on page 122)

Bad weather didn't keep
enthusiasts from enjoying
a great day of food, fun
and flying

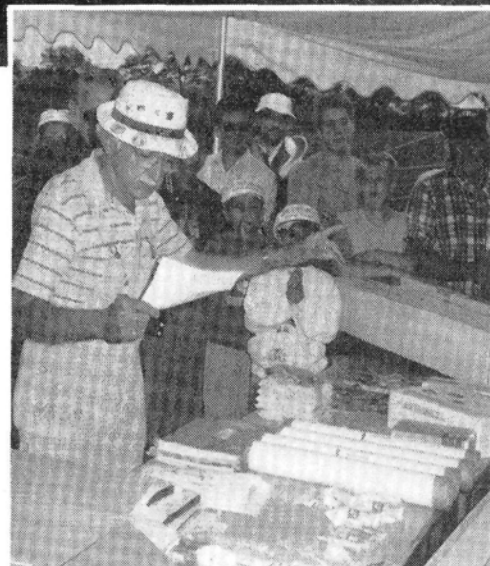
MAN 60TH ANNIVERSARY PICNIC

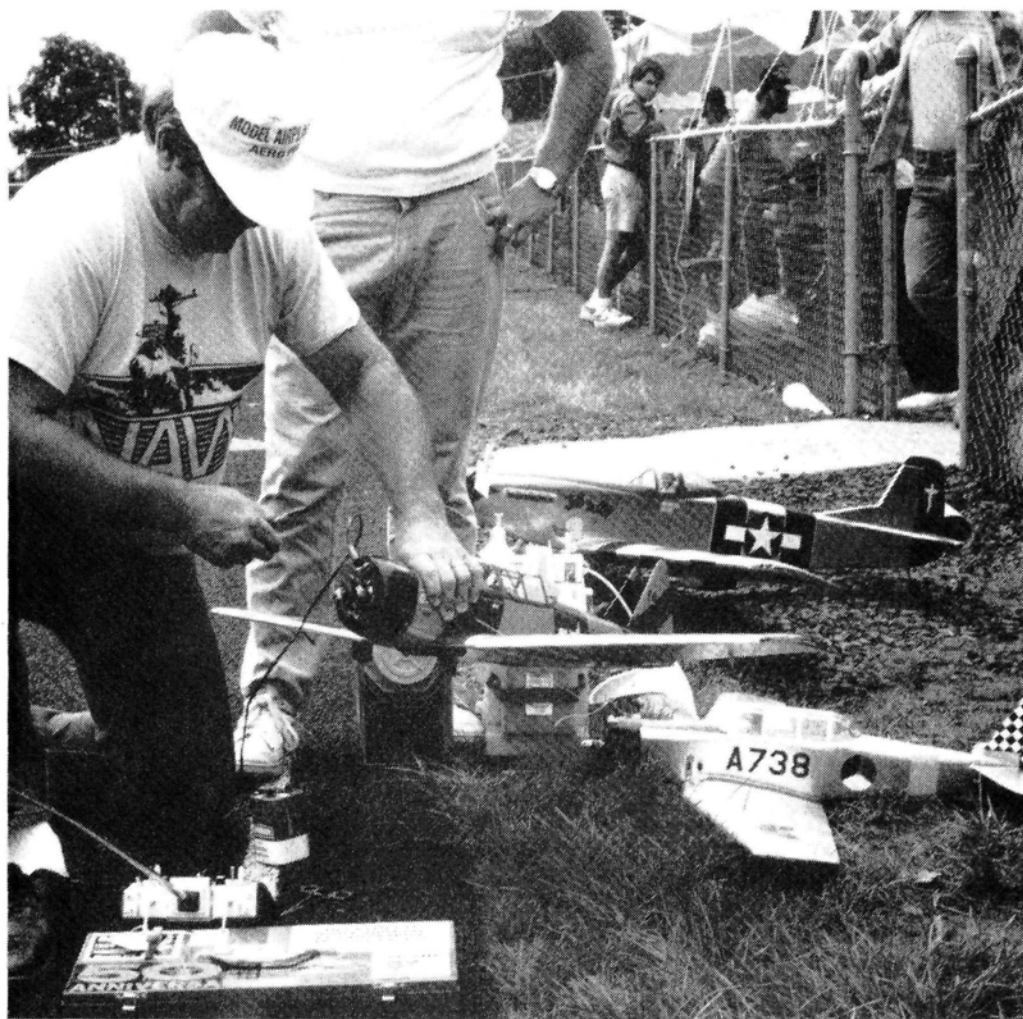
by REED KALISHER



HEAT AND HUMIDITY! In August, we expected both, but we hoped neither would reach 100! Dick Purdy (another *MAN* contributing author) and I watched the weather reports, and I spent hours making sure that my Dynaflyte Mustang was as pretty as it had been when I pho-

Above: A group of happy winners! Plaques, kits, radios, hats and food—everyone went home with something (not necessarily the airplanes they arrived with though!) Right: Event Director and organizer extraordinaire, Joe Beshar surveys a portion of the “bounty”—all donated by MAN supporters.





Left: Tim Farrell, designer of the Squint-Scale P-40, which was featured in our December issue, ventured all the way from up-state New York to participate. His T-6 (plan no. 4821) flew well.

tographed it for my August '89 article. The occasion? The MAN 60th Anniversary Aero Picnic, which was held in Mahwah, NJ, on August 19.

This year, I was determined to fly and not just to watch! The day started overcast with just a slight breeze, and during our ride there, the radio forecasters all seemed to agree on: "Clouding over this morning, with rain developing—heavy at times." Despite this warning, turnout was good: 150 registered fliers (not all of whom flew) and a crowd of spectators.

Picnic Perfect?

The contests were simple: timed flights lasting 2 minutes from wheels-off to touchdown. Each second

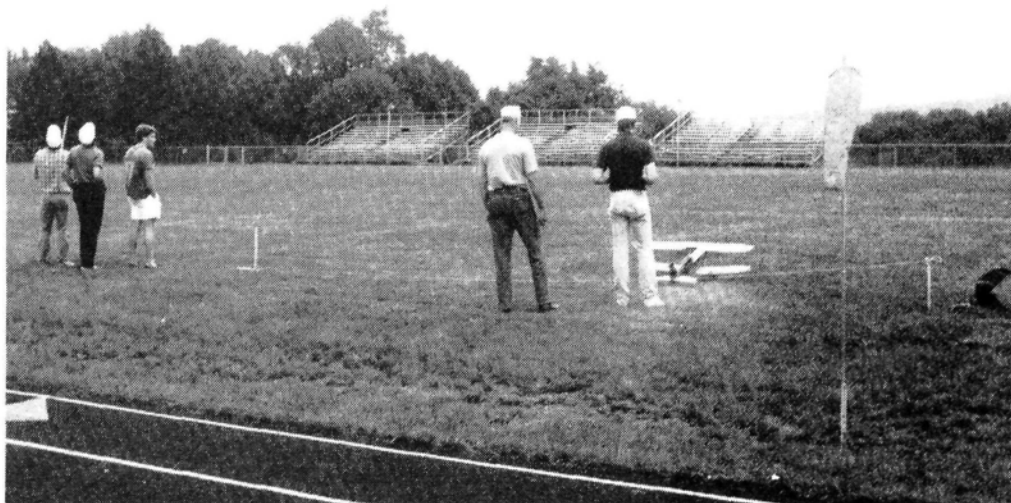
more or less than 2 minutes was deducted from a perfect score of 120, and no watches or timers were allowed (of course). The other contest

was a "People's Choice" static-judging by ballot. This kind of competition is great, because your flying and building skills aren't scruti-

nized to the point of intimidation. (That's why I entered!)

The flying started promptly at 9:30 a.m., and I was one of the first up. Two hours later, we felt the first raindrops. The flight line was put under the bleachers, the planes under cover, and the everyone headed for the shelter of their cars. Prospects for the rest of the day looked really bleak, but CD Joe Beshar grabbed the microphone to announce, "A prize for the first one who flies in the rain!"

Within four minutes, that prize was awarded!—a GM Plastics YAT-28 kit—and suddenly, the air filled with planes. The crowd cheered; the pilots returned to the field; and the day was saved. Every pilot who flew in the rain was awarded a prize; in

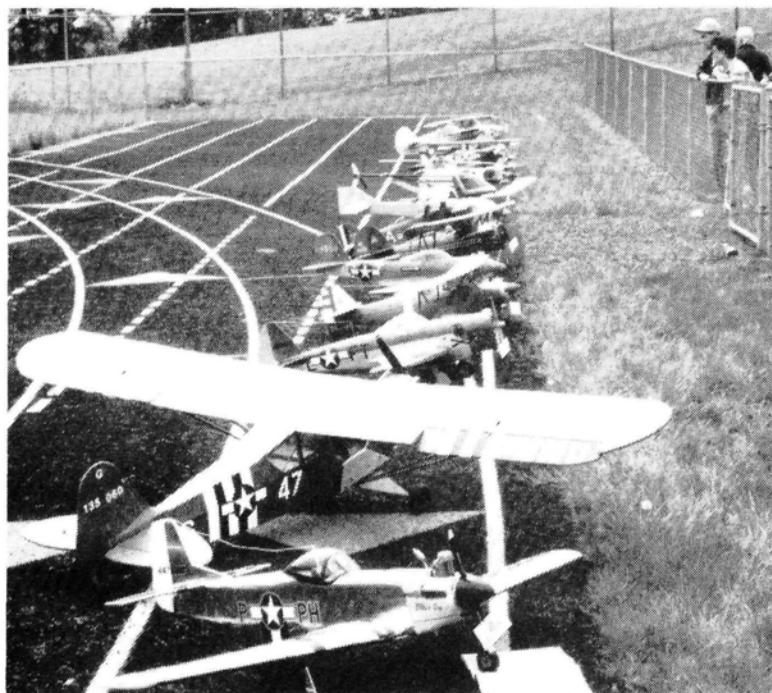


Flying portion of the event was held on an athletic field that proved more than adequate for the job, even for the larger models.

MAN 60TH ANNIVERSARY PICNIC



A successful (?) competitor: Tony Nunez had the dubious distinction of winning the "I tackled the goalpost—and lost" award! Judging from the damage, Tony did it like a pro—square on!



A portion of the static display—and these were only the sport-scale airplanes. Author's Dynaflyte Mustang is in the foreground.

fact, the generosity of the industry made it possible for every entrant to take home something. Wearing our *Model Airplane News* commemorative picnic hats, we

were determined to fly!

The site for the picnic was a school football field, so we had the goal uprights to contend with: "A prize to the first pilot who *hits* the up-

rights!" This honor took a little longer to win, but Tony Nunez from Freeport, NY, won a Duracraft Durabat (very appropriate!). While all this was going on, a great group of volunteers held umbrellas over the children who were busy building Delta Darts. Obviously, nothing would be allowed to rain on *this* parade! The winner of the Delta Dart flying competition was George Leontaris from North Arlington, NJ. Despite the free MAN lunch, the day did end a little sooner than we had anticipated, and the winners were announced at 2 p.m. The competition was tight in Timed

Flights and in Static Judging, which had to be decided by a tie-breaking toss of a coin. The top two timed flights differed only by .01 second! In Static Judging, the top

three fliers were awarded a Lee Renaud Memorial medal. (I took 4th by the flip of a coin.) I took home an Airtronics 4-channel Vanguard radio, and other prizes included a Lanier Pinto, kits from Carl Goldberg, Duracraft, Great Planes and many more supportive companies. Every entrant went home with something; everybody was a winner!

Despite the rain, we found a band of do-or-die fliers who turned the day into a real blast. CD Joe Beshar did a fabulous job of keeping the event moving, and his fellow club members were outstanding in their support of the event. Thank you all!

Joe tells me that he's been getting phone calls from as far away as Minneapolis, MN: "How do we run an aero picnic?" I think the answer is really simple: good planning, a little local support, and—the most important ingredient—the readers of *MAN* and their planes! The rest just happens!—if you're lucky, *without* the rain! ■

MAN AERO PICNIC WINNERS

Static Judging

- 1st Everett Pitt, Rome, NY; Top Flite Bell Aircobra
- 2nd Graham Jacobs, Walden, NY; Sig J-3 Cub
- 3rd Joe Karpowich, Mahwah, NJ; Waco YMF-3

2-Minute Timed Flight

- 1st Reed Kalisher, Danbury, CT/120.02 seconds
- 2nd Tony Nunez, Freeport, NY/120.03 seconds
- 3rd Ronald Leciston, Clifton, NJ/119.1 seconds
- 4th Graham Jacobs, Walden, NY
- 5th Robert Stowe, Ramsey, NJ

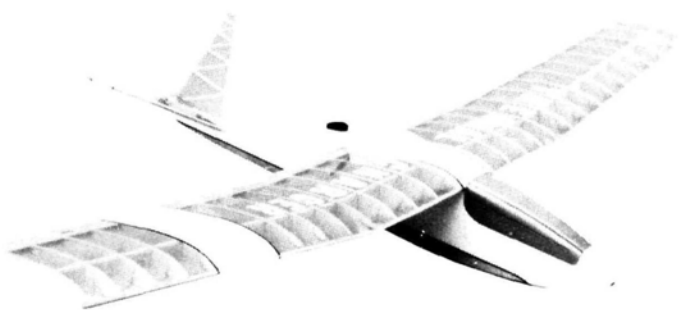
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HELI FUN FLY

(Continued from page 96)

by combining the time and judges' points for prototype-model maneuvering. Each contestant was allowed two rounds to earn a good score, and the models entered in this event ranged from a Cricket to some of the scale beauties.

Heli Honors

In the late afternoon, the awards and raffle prizes were awarded by allowing the 1st-place winner to select from a list of prizes. For some the folks, the decision was instant, but others had to ponder a while, as

the lists contained top-end Futaba, JR and Airtronics radios; O.S. engines; helicopter kits from GMP, Miniature Aircraft and Great Plains/Kyosho; Yale blades; GMP tool kits; Power Master fuel; tons of accessories from Robbe, Dr. J's, and Horizon Distributors; a Bob Violett fan jet kit; gyros, etc.

There was also at least \$4,000 worth of raffle items—the number of goodies seemed endless! The final award went to 10-year-old Dwight Larks, who won an Airtronics Vanguard radio for being the meet's Outstanding Novice.

As evening fell, the last people left the

field—particularly happy if they were taking home a prize! Flying skills improve every year and there were few crashes, none—as far as I know—the result of radio failure (and no one complained about electronic interference!). At one time, 13 helicopters were airborne, all within the boundary of a 100x200-meter field, without trace of frequency incompatibility. Hats off to today's R/C systems and to Chuck Winter and the Merced County R/C gang for running one of the best, and certainly the largest, helicopter fun flies in the country. If you'd like cop-

(Continued on page 108)

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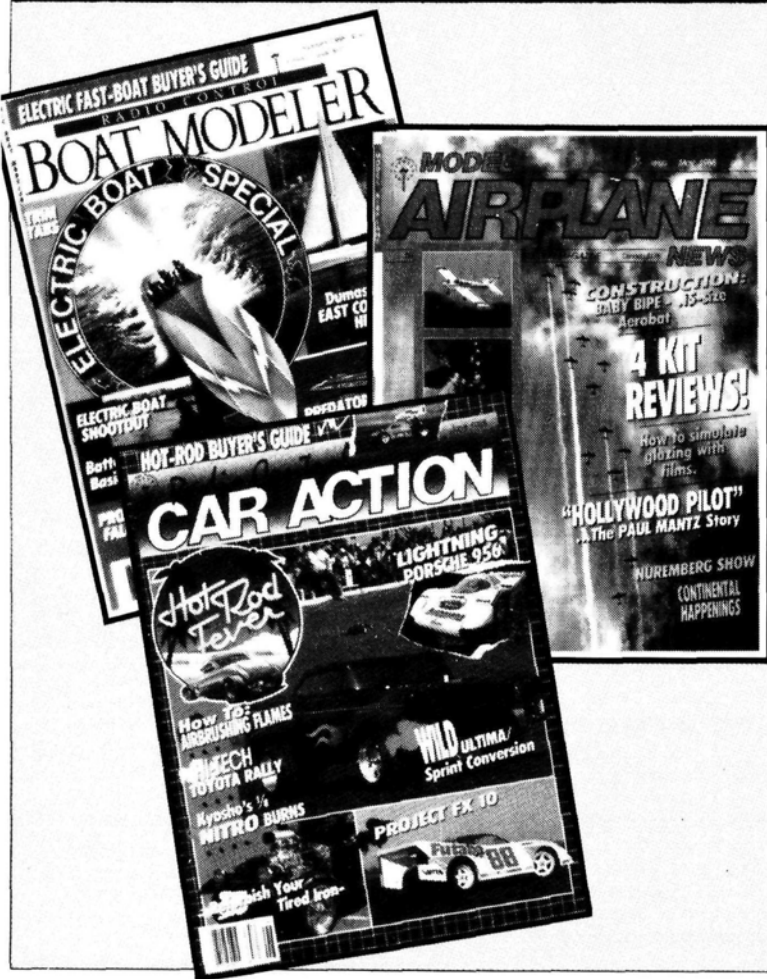
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CLUB OF THE MONTH



HEART OF TEXAS SOARING SOCIETY

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REMEMBER THE ALAMO?! Today, that famous landmark in the heart of San Antonio is overshadowed by skyscrapers. Even though this Texas city is now the country's tenth largest, the old character and charm fortunately remain. Beautiful San Antonio, with its Spanish-American heritage and scenic Riverwalk, is home to our latest "Club of the Month"—the Heart of Texas Soaring Society (HOTSS).

In September, the group held a special event—the Art Brown Memorial Contest. Despite strong winds, everything went smoothly; only a few planes suffered damage, and the new winch line only broke twice! The first one to get his name inscribed on the Art Brown Memorial Trophy is Lowell Howe, who won the award for his overall contest points, building skills, sportsmanship and club support.

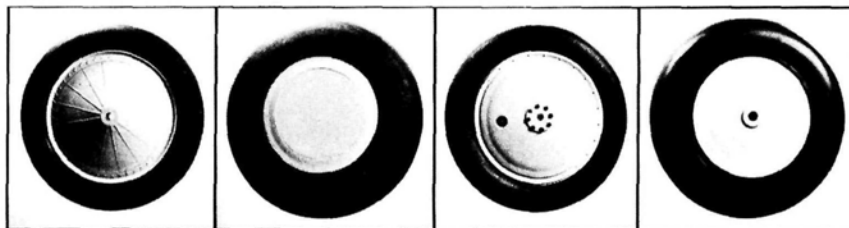
One HOTSS member has caught "aileron fever." He tells a story that may be familiar to some of you. He started in the hobby with an expensive ARF that he soon stranded atop a building. He then moved on to a Gentle Lady, a Gnome, a Bobcat, a Talon, an Antares, a Prophet, etc. Nostalgia made him want to save each one...a wing here, a bit of fuselage there—whatever he could rescue from the crash site! Luckily his skills have improved, and now he flies in public! His spirit unbroken, he has asked Santa for a Christy Mixer for Christmas.

HOTSS club members have the right spirit: they're involved in friendly competition, buying new kits, trying new maneuvers and getting ready for the next club fun fly. You can bet they're busy right now, at the work table or out on the field.

We're sending two free MAN subscriptions to our Club of the Month, deep in the heart of Texas. Congratulations, HOTSS!

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1 1/2"	3 1/8"
1 7/8"	3 3/4"
	4 3/8"
	5"
	6 5/8"

SMOOTH CONTOUR

3/4"	2 3/4"
1"	3 1/4"
1 1/4"	3 3/4"
1 1/2"	4 1/2"
2 1/4"	5 1/4"

GOLDEN AGE

sizes:	2 1/2"
1 1/2"	3 1/8"
1 7/8"	3 3/4"
	4 3/8"
	5"
	6 1/2"

BALLOON

2 1/2"	4 1/2"
3 1/4"	5 1/4"
3 3/4"	

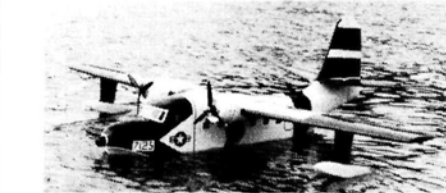
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HELI FUN FLY

(Continued from page 105)

ies of event descriptions, rules, etc., call or write to Chuck at Hobby Castle*. A special thanks to the manufacturers and distributors who sent merchandise for prizes; we wouldn't have had such a great time without you!

*Here's the name of the supplier mentioned in this article:

Hobby Castle, 60 West Olive Ave., Merced, CA 95348.

SCHLUTER HOP-UP

(Continued from page 84)

Head Lock and re-soldered it when I had mounted the remote jack. To start the engine, I simply attach the Head-Lock-type glow connector or a Ni-starter battery to the remote jacks. Cost: about \$8. (See photos 2 and 6.)

Photo 6 shows Du-Bro's* quick-fill fuel valve mounted inside the fuel tank cap—no more lines to remove to fuel or de-fuel! The less you disconnect a fuel line, the less chance you have of developing an air leak, mixing air with your jack. To start the engine, I simply attach the Head-Lock-type glow connector or a Ni-starter battery to the remote jacks. Cost: about \$8. (See photos 2 and 6.)

Photo 6 shows Du-Bro's* quick-fill fuel valve mounted inside the fuel tank cap—no more lines to remove to fuel or de-fuel! The less you disconnect a fuel line, the less chance you have of developing an air leak, mixing air with your fuel and having your engine run lean (or quit!). Photo 7 shows the fueler installed from inside the cap. After installing the fuel valve but before tightening the nut, install

and tighten the fuel-tank cap. Mark the bottom (6 o'clock position) of the fuel-tank cap and then remove it. Now position the angled fuel-line fitting onto the fuel valve at the mark you made. Tighten the nut and re-install the fuel-tank cap.

When you've finished flying for the day, you can remove the fuel by re-connecting the fuel-line adapter (not shown, but provided with the fueler) and tilting the helicopter rearward to help the fuel flow to the fueler. This costs about \$12.

Pipe Protection

Here are some details on an offset fuel-tank mount, which was originally made for mounting helicopter mechanics in a scale fuselage. Now, with the offset mount, you can run Schluter's new tuned pipe (part S0924). Without this offset mount, you can't run the new tuned pipe, because it will hit the fuel tank. Now, if you run a different kind of tuned pipe, look at photo 11. This offset mount allows you to mount the tuned pipe a little more closely to the side frames; it also redistributes the weight, offsetting the tuned pipe and header on the left side. Photo 9 shows the original on the left and the offset mount on the right. Cost: about \$20.

Blade Upgrade

Study photo 10 closely. Notice that the tail-rotor blade mounts are a little longer than usual and that four screws, instead of two, hold the halves together. There are two ball bearings inside, instead of only one, and this allows your tail rotor to operate more precisely. The stock blade holders have a little play in them before the tail rotor comes up to speed. With the two-bearing blade holders, two ball bear-

ings absorb the radial and thrust loads from the tail-rotor blades, and this increases the precision of your tail rotor.

To adapt your stock tail-rotor blade holders to two-bearing blade holders, you'll need to order the following Schluter parts: a pack of two-bearing blade holders (there are four halves to a pack); four bearings, part 364 (the bearings are *not* the same as the stock bearings); one pack of bearing shafts, part 396; four screws, part 020; and four nuts, part 010 (see drawing 1). This all costs about \$50, or you can order the complete tail-rotor setup (part 2805) for about \$60. With this setup, you'll also receive two extra 282 bearings, each worth about \$13. (I'll tell you more about these later.)

Muffle Up!

Every helicopter *should* have a muffler, and most clubs insist on them for engines more powerful than a .09. How important are they? How important is your flying field to you? You may fly at a field where noise isn't a problem, but it's a serious annoyance at many flying sites, and clubs lose their fields because of it. Mufflers are vital, but why not choose one that increases power!

Photo 11 shows a Hatori tuned pipe. This broad-range pipe won't need the "tuning" of sliding back and forth like the straight or airplane type. I usually set about an 1/8-inch gap between the end of the pipe and the top of the header. I run O.S.* engines with Super Tigre carbs (more on this later), and this distance has worked every time for me.

While flipping through a Byron Originals* catalog, I discovered the tuned-pipe

(Continued on page 115)

Classified

WANTED: Model airplane engines and model race cars made before 1950. Jim Clem, 1201 E. 10, P.O. Box 524, Sand Springs, OK 74063; (918) 245-3649.

SCALE DOCUMENTATION: Plan Enlarging. Photo packs, 3-view drawings for 1,600 aircraft. Super-scale R/C plans for Giant, Sport. 80-page catalog \$4. Scale Plans and Photo Service, 3209 Madison Ave., Greensboro, NC 27403; (919) 292-5239.

PLANS ENLARGED, Large Scale Specialists. PC Model Software. Free information. Concept, P.O. Box 669E, Poway, CA 92064; (619) 486-2464.

WANTED: Berkeley and Cleveland kits or related items: parts, plans, boxes, brochures, books, ads, radio equipment, accessories, etc. Gordon Blume, 4649-191st Ave. S.E., Issaquah, WA 98027.

GIANT SCALE PLANS by Hostetler. We fly what we draw. Send SASE to Wendell Hostetler's Plans, 1041 B Heatherwood, Orrville, OH 44667.

ENGINES: IGNITION, GLOW, Collectors, runners, used, new. Sell, trade, buy. SASE for list. Rob Eierman, 504 Las Posas, Ridgecrest, CA 93555; (619) 375-5537.

OLD TIMERS, take a ride back in time to airplane modeling roots with this vintage book—*Gas Models*. A true collector's book from the early editors of *Model Airplane News*. It contains the best of modeling from the '30s and '40s, including great technical information and classic construction articles from the Golden Age period. \$7.95, add \$1.75 S&H; Foreign Surface Mail, add \$2.75; Foreign Airmail, \$5.50; Payment must be made in U.S. funds drawn on a U.S. bank or by an International Money Order. Air Age Mail-Order Service, 251 Danbury Rd., Wilton, CT 06897.

NOW, OAK FLIGHT BOXES! Last a lifetime. New designs for easy handling. Extra convenience. Kits or finished. Free radio flyer decal, catalog. Write: S & D Model Products, P.O. Box 4026R, Des Plaines, IL 60016.

ANTIQUE IGNITION AND GLOW PARTS CATALOG: 100 pgs., timers, needle valves, original cylinder heads, point sets, drive washers, stacks, spark plugs, plans. Engines: Atwoods, Baby Cyclones, McCoys, Homets, others. \$8 postpaid U.S., Foreign \$20. Chris Rossbach, R.D. 1 Queensboro Manor, Box 390, Gloversville, NY 12078.

WANTED: RTF U/C planes and U/C race cars, mite cars; complete or pieces, with or without engines. Buy or trade. John Fietze, Box 1521, Amagansett, NY 11930.

WANTED: Model engines and race cars before 1950. Don Blackburn, P.O. Box 15143, Amarillo, TX 79105, (806) 622-1657.

CUSTOM EMBROIDERED PATCHES. Your design made any size, shape, colors. Five patch minimum. Free random sample and brochure. Hein Specialties, 7960 S.W. Manitou Trail, Glen Arbor, MI 49636.

FOR SALE: 1910-1960 model magazines, pulps, juvenile aviation books, historical aviation albums. \$1 list. Bruce Thompson, 328 St. Germain Ave., Toronto, Ontario, Canada M5M 1W3

R/C WORLD—ORLANDO, FL, CONDO RENTALS—2-3 bedroom-furnished. Available weekly or monthly. Low rates. 100 acre flying field with enclosed hangar. Swimming pool, tennis courts on site. Minutes from Disney World and Epcot Center. For information call Kyra, (800) 243-6685 or write to Air Age Inc., Condo Dept., 251 Danbury Rd., Wilton, CT 06897.

SCALE MODEL RESEARCH Aircraft Documentation. World's largest. Over 2,700 different Foto-Paaks and 5,000+ drawings. Catalog \$3. 2334 Ticonderoga, Costa Mesa, CA 92626 (714) 979-8058.

HELICOPTER SCHOOL, 5 days and nights, all equipment supplied. Plus room and board on a 67-acre airport with lodge, used exclusively for R/C Training. Opening January, 1990 in North Central Florida. Owned and operated by Ernie Huber, 5-time National Helicopter Champion and Helicopter Designer. Plan your winter or spring vacation NOW! Send \$2 for complete information package to: R/C Flight Training Center, P.O. Box 727, Creston City, FL 32112-727.

WANTED: Old unbuilt plastic model kits. Planes, military, figures, cars, promos. Aircraft or missile desk models. Send list, price. Models, Box 863, Wyandotte, MI 48192.

WANTED: Your plan or kit for *Flying Model Warplanes: An International Guide*. Companies and individuals encouraged to register. Send Catalog to John Fredriksen, 69 Flamingo, Warwick, RI 02886.

PRIVATE COLLECTION: Hundreds of aviation magazines for sale: *Popular Aviation*; *Flying*; *Model Airplane News*; *Air Trails*; *RAF Flying Review*; *Wings*, and many others (1932-1960). All in excellent condition. For list, send \$2 to William C. Fort, Jr., 4161 Robin Hood Rd., Jacksonville, FL 32210.

TURBOJET ENGINES for R/C Model Aircraft, Jet101, JetFan, Pegasus VTOL, F101 with afterburner. Most sophisticated Model Turbojet Engines in the world. Replaces Duct Fan Units. Complete catalog \$5. JMW, Dept. 2, Box 60099, Pasadena, CA 91106.

WANTED TO BUY: Flying saucer and UFO plans and/or kits. Gas-powered or electric or rubber-band powered. Will buy complete assembled flying models. Klark Kent, P.O. Box 392, Dayton, OH 45409 (513) 298-7116.

STUFF YOUR MAILBOX—R/C Catalogs, info., \$2. J. Braddy, 3037 Audrey Dr., Gastonia, NC 28054.

CLEVIS REMOVER, shipped, engraved, \$8.50. Reynolds, 1707 Carter, Vidalia, LA 71373.

AMAZING AMERICAN EAGLE GLIDER. Majestic full 21" span free-flight glider. High-performance/authentic detail. "Awesome!" \$5 plus \$1 postage. GARUDA GLIDERS, Box 461N, Kula, HI 96790. (Offer expires 4/30/90.) Distributors wanted.

LANCASTER BOMBER. Beautiful B&W 16x20 photo for \$14.95. Inquiries welcome/free brochure. CPC Productions, P.O. Box 9342, Seattle, WA 98109.

AERIALS—AERIALS—AERIALS—AERIALS—Shoot stunning action video and video-assisted stills! Build our 4-ounce, 2 1/4x4-inch TV transmitter, under \$120. Color/BW, audio subcarrier, two power levels. Complete plans, plus microcam and kit information, \$9.95 +\$2. S&H. Satisfaction Guaranteed. Supercircuits, 1403-A Bayview, Hermosa Beach, CA 90254.

RANDOLPH DOPE, BUTYRATE, NITRATE. Clear, colors, thinners. New sport/stunt Control Line kits. .19 to .50 engine sizes. Send \$1 for information pack to, ABC Hobby Supplies, P.O. Box 2391, Clarksville, IN 47131.

ATTENTION: EARN MONEY READING BOOKS! \$32,000/year income potential. Details. 1-602-838-8885 Ext. Bk 15272.

ATTENTION—HIRING! Government jobs—your area. \$17,840—\$69,485. Call 1-602-838-8885 Ext. R 15272.

FOR SALE: Shuttle helicopter never flown. Includes O.S. Max 28, Futaba 5N1H radio, GMP Gyro, remote glo adaptor. List \$829, asking \$495. Larry Katz, 545 Clawson St., S.L., NY 10306.

EASY-OF-FLYING RATINGS OF R/C TRAINERS, \$1.95 plus 45¢ postage. Jim Waterman, 3818 Deerfield, San Antonio, TX 78218.

LIQUIDATION SALE. Top-quality ARF trainer for 3- or 4-channel radio, 19 to 30 engines. Wing span—47.25 inch, area—387 sq. in. Weight 50-57 oz. For only \$59.95, delivery to you. Call (213) 944-8899.

OLD MAGAZINES: Back issues of *AAM*, *AM*, *FM*, *MAN*, *RCM*, *Air Trails*, *Air Classics*, *Sport Aviation*, others. 1932-1987. Send \$1 for list. Marshall Smith, 46 Fern Hollow Dr., Granby, CT 06035.

ENGINE COLLECTORS: The first 100 Fitzpatrick engines that were originally set aside and serialized are now available to the dedicated collector. The most beautiful engine (61) in the world. Double ball bearing. Beautiful muffler included. \$299.98. (213) 477-2092. Send to Fitzpatrick #303, 2120 Bentley, West L.A., CA 90025.

ENGINES OFFERED: Maybe I have that special engine you are looking for—many N.I.B. or near new, some for your collection perhaps. Call or write, SASE for list and super prices. Murrel E. Wald, P.O. Box 235, Keauau, HI 96749, (808) 966-9642.

IRON-ON STITCHED HINGES—Fuelproof, no wood cutting, no gaps, no friction, balsa colored, paintable. Two 36"x1" strips per package. Send \$4 plus SASE to: E&L Trading Co., 4455B Lamont St., San Diego, CA 92109.

Send ad and payment to *Model Airplane News*, 251 Danbury Rd., Wilton, CT 06897. **Non-Commercial classified ads** (commercial ads of any kind not accepted at this special rate). Rate: 15 words or less, \$4.50 payable in advance. No charge for name and address. Additional words, 25¢ each. **Commercial classified ads** (rate applies to anyone selling on a commercial basis—retailers, manufacturers, etc.) Rate: 50¢ per word, payable in advance. Count all initials, numbers, name, address, city and state, zip and phone number. **Closing Date** for either type of ad is the 20th of the third preceding month (for example, January 20th for the April issue.) We do not furnish box numbers. If you would like your ad run in more than one issue, multiply amount of payment by number of months that ad is to run. It is not our policy to send sample copies of tear sheets.

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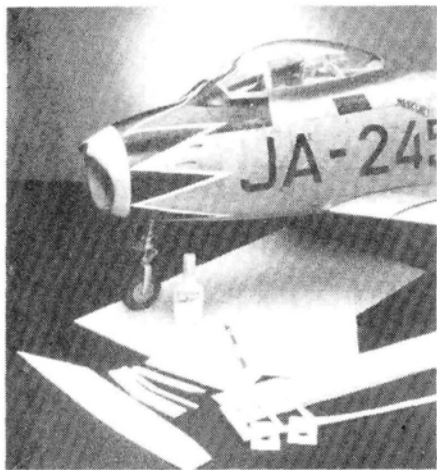
Product News



WING MANUFACTURING New Short Kit

Wing Manufacturing has added another R/C warbird to its Easy-Build short-kit line. The F4U Corsair was designed by master-builder and flier Lamar Alexander. As with all short kits, the Corsair is designed around a strong, box-frame fuselage and a foam-core, stress-skin wing. The flying habits of this Corsair are superior, with no tip stall or bad ground-handling tendencies. The Corsair short kit comes with: four panel foam wing cores; pre-formed, detailed cowlings; formed canopy; formed belly fairing; plywood fire wall; landing-gear blocks, straps and screws; steel engine mounts, two sheets of plans with step-by-step, illustrated construction details; and a bill of materials for wood and off-the-shelf hardware. It takes a .40 to .60 engine, has a 56-inch span and weighs 5.5 pounds. Price: \$44.95; the additional wood package is \$38.95.

For more information, contact Wing Manufacturing, 306 East Simmons, Galesburg, IL 61401.

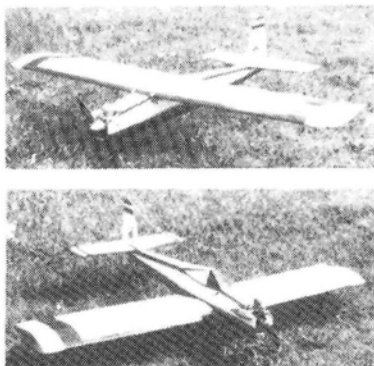


HOUSE OF BALSA Mighty Lite Plywood

Mighty Lite, a premium-grade plywood, is now available in the U.S., exclusively from House of Balsa and Frank Tiano

Enterprises. Mighty Lite is currently offered in three convenient sizes: $\frac{1}{8}$ x6x12 inches and $\frac{1}{8}$ x12x48 inches. Might Lite offers a smooth-grain finish and a new lamination process that resists splintering, warping and flaking. This premium-grade wood is far lighter than 5-ply woods, yet it's just as strong. The ultra-smooth finish allows faster preparation before finishing. Mighty Lite cuts effortlessly with a hobby knife and bonds easily with ZAP or CAs.

For more information, contact House of Balsa, 20130 State Road, Cerritos, CA 90701, or Frank Tiano Enterprises, 2460 S.W. 85th Terrace, Davie, FL 33324.



VISION MODELS Double Vision

The moveable wing on the Double Vision makes this the perfect trainer for the novice, and, at the same time, an all-purpose plane for the fun-fly enthusiast. In the high-wing configuration, it's a stable trainer. When the wing is moved to the lower position, it becomes an aerobatic sport plane in just 10 minutes. The easy-to-build kit includes hand-cut balsa and plywood, full hardware package, two full-size rolled plans, detailed drawings, assembly photo sheets and an instruction book. Price: \$79.95, plus \$5 shipping and handling. The Double Vision ARC is \$159.95, plus \$7 shipping and handling.

For more information, contact Vision Models, Inc., P.O. Box 130, Freeland, MI 48623.



AVCO MODEL SUPPLIES Scale Cockpit Kits

Avco has expanded its line of detailing products to include scale cockpit kits for the more popular designs from Platt, Sig, Scale Flight, Balsa USA and other giant-scale suppliers. The AT-6 cockpit kit shown is available to fit the Ziroli design. Typical of the Avco line, it's vacu-formed from high-impact, white polystyrene. Assembly and painting instructions are included.

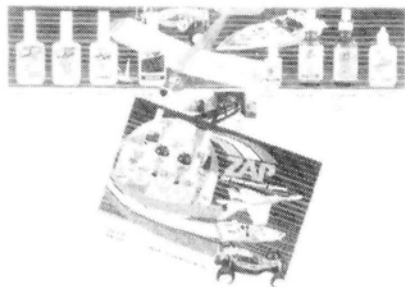
For more information, contact Avco Model Supplies, 205 Gulf Bank, Houston, TX 77037.



BYRON ORIGINALS The Ryan ST-A

One of the more popular aircraft of the classic era, the Ryan ST-A is now available as a Byron Originals' Complete-Kit Concept. The $\frac{1}{4}$ -scale Ryan ST-A features a hand-laid fiberglass cowl, fuselage and wheel pants for fast, accurate building. No carving or extensive sanding is required. All panel lines are automatically reproduced in every fiberglass component. Wings and tail surfaces are strong, lightweight, injection-molded polystyrene foam. These components are nearly ready to finish and are completely indexed for hinge locations and the installation of wing hardware. Scale cowl components and chrome exhaust stacks are included for construction of either the Menasco or Ranger versions. Price: \$439.95, plus \$10 shipping.

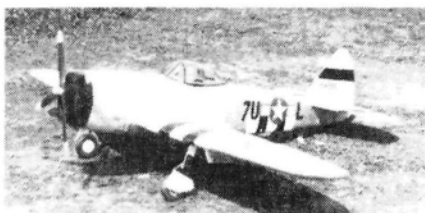
For more information, contact Byron Originals, Inc., P.O. Box 279, Ida Grove, IA 51445.



ZAP Instructional Booklet/Catalog

ZAP's new, 1990 four-page instructional booklet/catalog not only identifies each product in the "Total Adhesive System," but it also explains how and when each ZAP product is best used.

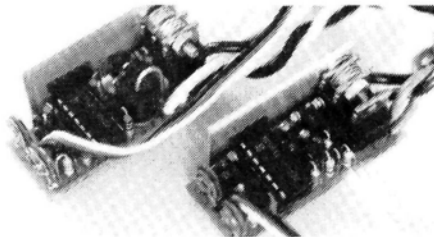
For a free copy of this full-color publication, send a large SASE to your nearest ZAP regional sales office: House of Balsa, 20130 State Rd., Cerritos, CA 90701; Robart, 310 North 5th St., St. Charles, IL 60174; or Frank Tiano Enterprises, 2460 S.W. 85th Terrace, Davie, FL 33324.



DAVEY SYSTEMS P-47 Thunderbolt

Davey Systems now offers the sport-scale P-47 Thunderbolt, a 54-inch wingspan version of WW II's toughest fighter-bomber. The kit can be built as a fun machine or as a beautiful stand-off scale model with flaps and retracts. It contains die- and machine-cut balsa, plywood and hardwood parts, as well as a pre-formed landing gear and a large selection of hardware. The kit also includes step-by-step instructions, rolled plans and pre-cut fuselage sides and tail feathers. The wing area is 530 square inches, and the flying weight is 5½ to 6 pounds for .45 to .60 2- or 4-stroke engines. The P-47 has ample room for a large, electric motor and the required batteries. Price: \$99.95.

For more information, contact Davey Systems Corp., 675 Tower Lane, West Chester, PA 19380.



HOWARD CANO Electronic Throttles

Two, new, low-cost electronic throttles are now available directly from designer/writer Howard Cano. Both are very small (.8x.9x2.1 inches) and light (1.2 ounces). No. EFT is for airplanes using 6 to 24 cells. Basic kits are also available.

Price: \$29.95, without connectors.

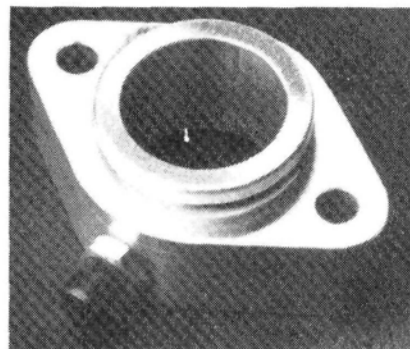
For more information, contact Howard W. Cano, Box 5627, Arvada, CO 80005.



SIG MANUFACTURING Hazel Sig Pilot Kits

For years, modelers have been asking for a Hazel Sig pilot bust to give their giant-scale models that touch of realism. Now you can choose from three different versions. For enclosed cockpit models, the basic Hazel pilot (with full head of hair) or the Hazel pilot with baseball cap will look just fine. The Hazel pilot with helmet is intended for open-cockpit models. The helmet and liner are faithful reproductions of the one Hazel uses in her full-scale Spacewalker. All versions come with the jacket molded in either red or blue, and Sig wing decals are included. Molded from soft vinyl latex rubber, these pilots are lightweight and surprisingly lifelike. Assembly and finishing are easy using the supplied instructions.

For more information, contact Sig Manufacturing Co. Inc., 401-7 South Front Street, Montezuma, IA 50171.



JET PERFORMANCE PRODUCTS Carburetor Adapter

Jet Performance Products offers a carburetor adapter that fits all Rossi 65, 81 and 90 engines. The adapter allows you to fit an O.S. 77 ducted-fan carburetor to any of these Rossi engines, and this enables the Rossi 65 Dynamax combination to pick up about 2000rpm, which puts it above 22,000rpm. The 81 or 90 engine combined with the Byrojet fan unit, can pick up a minimum of 1,000rpm. Price: \$39.95.

For more information, contact Jet Performance Products, 10626 Dakota Way, Everett, WA 98204.



ROAMIN' RESEARCH WW II MiG 3

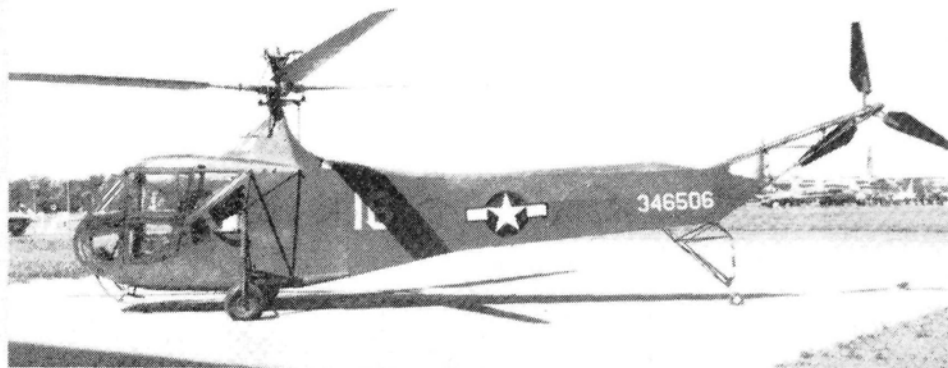
For sheer excitement, nothing comes close to flying a scale WW II model. The Roamin' Research MiG 3 will help you relive those exciting moments in aviation history. This ¼-scale, 101-inch wingspan WW II Russian fighter is of all-built-up construction with balsa and plywood. It uses functional flaps and requires a 3.0 cubic-inch engine. Instruction booklet and plans are included. Fiberglass cowl, air scoops and exhaust, and a clear canopy are available as accessories.

For more information, contact Roamin' Research, P.O. Box 104, Yale, MI 48097.

NAME THE PLANE CONTEST

CAN YOU IDENTIFY THIS AIRCRAFT?

If so, send your answer to **Model Airplane News**, Name the Plane Contest (state issue in which plane appeared), 251 Danbury Rd., Wilton, CT 06897.



Congratulations to Kenneth Ramsburg of Thurmont, MD, for correctly identifying the Martin-Baker M.B. 5 single-seat fighter featured in the December issue. Ken's name was chosen from the 42 correct answers we received. The most common *incorrect* answer? Just as we thought—the P-51 Mustang! Boy, put a scoop on the bottom of an airplane, and someone will surely call it a '51!

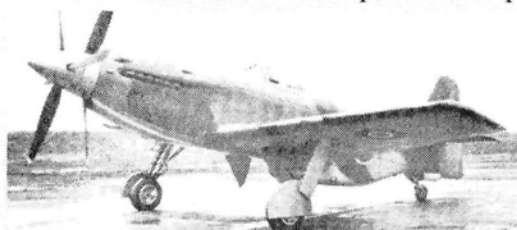
Actually, the M.B. 5 was a single-seat fighter built at the end of WW II by the Martin-Baker Aircraft Company in Britain. Powered by a Rolls-Royce Griffon V-12, liquid-cooled engine driving counter-rotating props, the M.B. 5 first flew on May 23, 1944. This power package was similar to that used on the Red Baron racing Mustang which crashed at Reno a few years ago.

The M.B. 5 had a 35-foot wingspan; it was 37 feet, 9

inches long; and it was equipped with cannons mounted in each wing. Its performance was exceptional, with a maximum speed of 460mph at 20,000 feet. Although the plane's design caused it to be considered one of the best fighters of the period, it never saw action; the war was ending, and peace and jets were on the horizon.

If you think the M.B. 5 would make a great R/C model, you're probably right. Noted scale builders and super fliers Dan Parsons and Ted White thought so too; they were flying M.B. 5s 10 years ago!

What ever happened to Martin-Baker? The company narrowed its sights and decided to produce airplane *parts*, rather than complete airplanes. What kind of parts? Ask any Navy (or A.F.) fighter pilot what kind of "office" chair he works in—he'll tell you! Right!—an ejection seat! ■



The winner will be drawn four weeks following publication from correct answers received (on a postcard delivered by U.S. Mail), and will receive a free one-year subscription to **Model Airplane News**. If already a subscriber, the winner will receive a free one-year extension of his subscription.

WWI Buff's Dream FABULOUSLY DETAILED SCALE R/C PLANS

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ELECTRIC R/C & REALISM...NOW!

Featuring pioneering aircraft, decades ahead in design & uniquely suitable for Electric R/C with incredibly realistic flight & details.

Full cockpits & cable controls on all*

Great for AMA Scale or Sport/Stand-Off.

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05 Classics



JUNKERS J.2 1916!

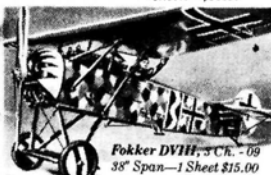
Amazing steel exp. fighter
58" Span 522 sq. in. 4 Ch.
Astro Geared Cobalt 05 or Glow
2 Sheets—\$29.00



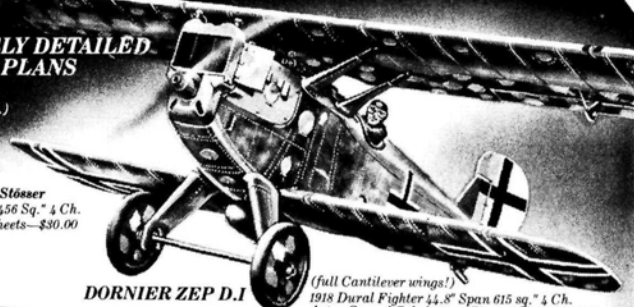
Fok 56 Stöcker
56" Span 456 Sq. in. 4 Ch.
- 05 2 Sheets—\$30.00



Polish RWD.8
55" span 480 sq. in. 4 Ch.
Scale folding wings - 05
2 Sheets—\$30.00



Fokker D.VIII, 3 Ch. - 09
38" Span—1 Sheet \$15.00



DORNIER ZEP D.I

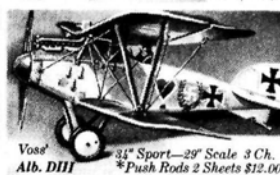
(full Cantilever wings!)
1918 Dural Fighter 44.8" Span 615 sq. in. 4 Ch.
Astro Geared Cobalt 15 or Glow 2 Sheets \$33.00



Albatros D.II - 2 Sizes:
54" 4 Ch. - 3 Sheets \$26.00
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Voss' Alb. D.III
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Add 8.5% for N.Y. resid.

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Box 1425, F.D.R. Station, New York 10150

SCHLUTER HOP-UP

(Continued from page 108)

mount shown in photo 12. The end on the left is "cupped" or shaped to fit the contour of the tuned pipe. Before installing the tuned-pipe mount on the side frames, coat the cupped surface with some high-temperature silicone. (I use Loctite*.) The silicone acts as a barrier between the steel tuned-pipe mount and the aluminum tuned pipe. Next, put a piece of wax paper over the silicone and join the mount to the side frames using the pre-drilled hole on the other end. Put the tuned pipe into place, and hold it on the mount with a hose clamp, as shown in photo 11. When the silicone has dried, remove the wax paper and remount the pipe with the hose clamp. Costs about \$100.

Imported by Futaba*, Hatori headers are available for several engines. If you can't find the one you need, contact Futaba. On the headers, be sure to note the small sheet-metal screw above the socket-head bolt. This is an "anti-rotation" device. There was apparently enough pressure from the engine to cause the tuned pipe and its mount to rotate around the pipe-mount socket-head bolt. Now the pipe mount is locked into place, so it doesn't rotate.

Hard-to-Beat Bearings

I've told you about the Schluter ball bearings (part 282). These bearings replace the bushings (part 1582) on all four-pitch and cyclic bellcranks and on the tail-rotor bellcrank. You'll have to install 10 of them, and I know you'll see a big improvement as soon as you hover. (See drawing 2.) Costs between \$50 and \$125. Some of the cost depends on whether you ordered the complete tail-rotor setup; some hobby shops have a replacement bearing (one for R/C cars, perhaps?) that's cheaper.

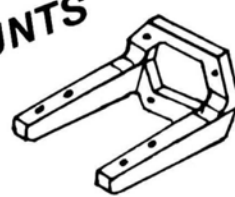
Strut Your Stuff!

Photo 5 shows Miniature Aircraft's* Tuff Struts, which really are very strong, but not unbreakable. I managed to break some in a crash. When I was learning to do autorotations, I occasionally misjudged my altitude to start flaring and adding collective pitch and would end up about 2 feet off the ground. From there the helicopter would "plop" onto its skids, which would absorb the impact without being damaged.

Schluter also makes fiber-filled struts (like the fiber-filled motor mounts for airplanes) for the Scout and the '89 Champion. They're also available as re-

(Continued on page 118)

IT'S MODEL **TATONE** for precision Aluminum **MOTOR MOUNTS**



FOUR CYCLE

Alloy Alluminum Machined Beams	Drilled & Tapped 90° Thrust Line
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T4-40 \$8.95	60-90 \$11.25
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If not available from your hobby shop, ORDER DIRECT Check, MO, VISA, MC or COD accepted. Add \$2.50 for S&H, 2.00 for COD. California residents add 6 1/2% sales tax.

TWO CYCLE

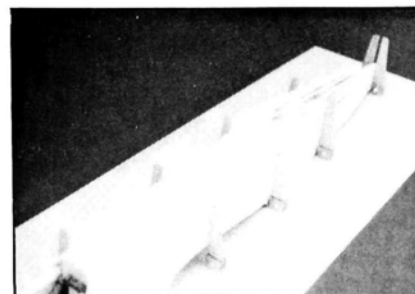
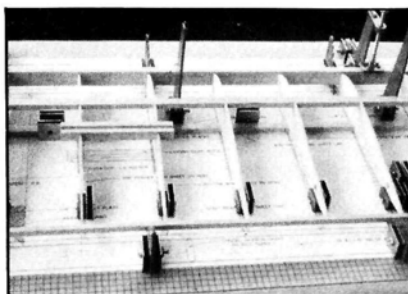
Machined Beams Engine Mounting Bolts Incl.
1/2 A Sh Bm \$3.90
1/2 A Lg Bm 4.10
.09 4.75
.15 Lg Bm 4.95
.19-3.5CC 5.85
.29-40 Lg Bm 6.80
.40-61 Sh Bm 6.50
.40 RV Pylon 7.75
.60 Pattern 10.25

GIANT SCALE

Alloy Alluminum Machined Beams Engine Mounting Screws Incl.
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OS Max 1.08 19.95
Super Tigre-2000, 2500 & 3000 19.95
Zenoah G-38 19.95
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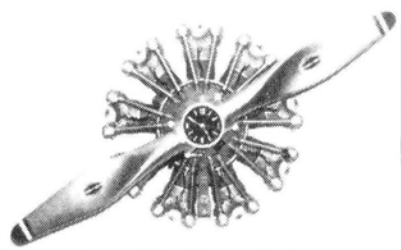
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SCHLUTER HOP-UP

(Continued from page 115)

placements for existing Champions. I've worn out a set of Tuff Struts flying off asphalt and concrete. Photo 5 shows small pieces of rubber tubing slipped over the skids to prevent the struts from touching the ground and wearing out the struts. Schluter has a unique way of mounting the skids to the struts: the struts don't touch the ground, but are bolted together from inside the ski. (See drawing 3.) Costs about \$30.

Super Springs

Just out for the Champion and the Scout are new, lightweight, autorotation springs (Schluter part 3461 replaces part 247.) Unlike most other helicopters, instead of having a one-way bearing, the Champion has a "clicker" autorotation hub. (See drawing 4.) I've never had trouble with my Champion autorotation system, but the clicker system did use up a lot of energy in an autorotation. With the new springs installed, the pressure required to turn the blades seems to be less than half

(Continued on page 122)

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For further details or information on our special introductory offer, call toll-free 1-800-243-6685 and ask for Katherine Tolliver.

SCHLUTER HOP-UP

(Continued from page 118)

of that previously required. Although I haven't yet tried them, Vince at Robbe told me that I'll love doing autos with the new springs installed! The cost is \$2.

Although I haven't discussed every possible Champion modification, these are the ones I've made. I hope you enjoy them as much as I do.

*Here are the addresses of the companies mentioned in this article:

Schluter; distributed by Robbe Model Sport, 180 Township Line Rd., Belle Mead, NJ 08502.

Rocket City Specialties, 103 Wholesale Ave. N.E., Huntsville, AL 35811.

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SPORTY SCALE

(Continued from page 99)

AGD and Checking Your Six

I've promised to clarify some things I mentioned in a few past columns. First of all, when I said that somebody's AGD crapped out, I was talking about Dave Platt's new invention, the Anti-Gravity Device. And yes, when it gives up, you've had it! Next, I get at least a dozen letters each month asking what I mean by "checking your six." So I wouldn't have to answer everyone individually, Stunning allowed me some space to explain it. You see, when somebody who might want to do you harm is behind you, and you have on a hat, goggles and a refrigerator door strapped to your back, you just might not be aware that this dastardly dude is back there. Now, if this person suddenly ran ahead of you, he'd be in your 12 o'clock position, right? If he slowly strolled to your right a few paces and stopped, you'd find him at approximately 2 o'clock on your watch dial, right? Well, if you had a feeling he was back there, what would you do? No, you wouldn't look at your watch! You'd turn around and check the 6 o'clock position. It's something like the movie, "12 O'Clock High," which, regardless of what Chianelli tells you, is not about a bunch of dopers skipping lunch!

*Here are the addresses and phone numbers that are pertinent to this article:

Eagle Squadron R/C Models, 818-841-9572.

Airtronics, Inc., 11 Autry, Irvine, CA 92718.

Aeroloft Designs, P.O. 326, Hinsdale, IL 60522.

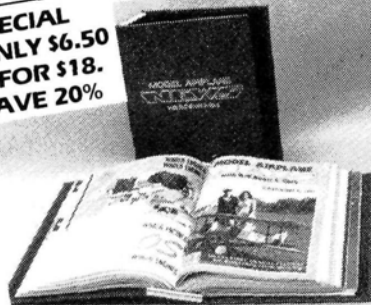
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